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METAL-MINE ACCIDENTS

IN THE

UNITED STATES

DURING THE CALENDAR YEAR 1915

COMPILED BY

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METAL-MINE ACCIDENTS DURING THE CALENDAR YEAR 1915.

Compiled by **ALBERT H. FAY.**

INTRODUCTION.

There was a slight decrease in the number of men killed in the metal mines of the United States in 1915 as compared with 1914, the total number killed as reported to the Bureau of Mines by the operators being 553 in 1915, as compared with 559 in 1914, 683 in 1913, 661 in 1912, and 695 in 1911. The number of men reported employed, however, during 1915 was slightly less than the previous year, being 152,118 as compared with 158,115 in 1914. The fatality rate, therefore, in 1915 was slightly higher than in the preceding year, being 3.64 per 1,000 men employed in 1915 as against 3.54 per 1,000 in 1914; 3.57 in 1913; 3.91 in 1912; and 4.19 in 1911.

The decrease in the number of employees is more apparent than real. In 1913 and 1914 the bureau collected accident and labor statistics from both mines and metallurgical works. These data were collected on separate forms, so there is the possibility that the mine employees included many mill and smelter men. For 1915, the same card contained forms for both mines and metallurgical works, and as the forms were filled out at the same time all possibility of duplication was eliminated. The number of persons employed at mines and metallurgical works for the past three years is as follows:

Number of men employed at metal mines and metallurgical plants.

Year.	Mines.	Mills.[a]	Smelters.[a]	Total.
1913	191,276	14,985	20,564	226,825
1914	158,115	15,128	27,879	201,122
1915	152,118	18,564	31,327	202,009

[a] Fay, A. H., Accidents at metallurgical plants in the United States during 1915, Tech. Paper 164, Bureau of Mines, 1916, p. 3.

There were reported 35,295 nonfatal injuries for 1915, of which 35 resulted in permanent total disability and 574 in permanent partial disability; 7,242 were injuries of a temporary nature, involving the loss of more than 14 days' time, and 27,444 were minor injuries wherein the time lost was 1 to 14 days. The nonfatal injury rate per 1,000 men employed was 232 as compared with 191 for 1914. This increase is not necessarily significant of an increased hazard, but indicates that the dangers are more fully set forth by reason of better records at the mines and more complete reports to the bureau.

Fatalities, and number killed per 1,000 employed, by States, in the metal mines in the United States during the calendar years 1911 to 1915.

State.	Number killed.									
	1911		1912		1913		1914		1915	
	Total.	Per 1,000 employed.	Total.	Per 1,000 employed.	Total.	Per 1,000 employed.	Total.	Per 1,000 employed.	Total.	Per 1,000 employed.
Alabama	10	2.44	33	6.84	22	4.22	25	4.78	12	2.42
Alaska	(a)	(a)	[b] 21	10.97	25	3.13	19	2.38	22	2.71
Arizona	70	5.48	67	4.30	86	5.22	63	4.50	41	2.92
Arkansas	2	3.42	1	2.48	....	....	....	....	1	1.46
California	38	3.49	40	3.88	52	4.53	41	4.20	49	4.71
Colorado	43	4.13	48	5.40	44	2.76	47	5.09	49	7.69
Connecticut	0	....	0	....	0	....	0	....	0	....
Florida	9	2.09	6	1.34	14	3.09	10	3.47	3	1.73
Georgia	2	2.00	0	....	1	2.25	1	3.28	1	3.39
Idaho	23	4.79	29	4.66	24	4.16	25	4.76	25	4.82
Illinois	1	1.18	1	2.27	1	1.96	0	....	3	7.81
Iowa	1	4.10	0	....	0	....	0	....	2	9.35
Kansas	2	2.74	2	2.41	4	6.58	1	3.17	2	4.60
Kentucky	3	6.51	1	2.17	0	....	2	9.05	0	....
Maine	0	....	0	....	0	....	0	....	0	....
Maryland	0	....	0	....	0	....	0	....	0	....
Massachusetts	0	....	0	....	0	....	0	....	0	....
Michigan	134	4.24	96	3.26	82	2.91	99	3.63	99	3.60
Minnesota	76	4.59	50	3.02	63	3.22	43	2.43	36	2.47
Missouri	38	3.84	36	3.16	34	3.49	25	2.95	44	4.60
Montana	62	4.65	50	3.75	64	3.28	39	2.99	62	4.48
Nevada	50	8.05	34	4.51	25	3.42	22	3.23	18	3.15
New Hampshire	0	....	1	11.11	0	....	0	....	0	....
New Jersey	23	13.23	13	7.96	8	5.58	4	2.93	9	5.16
New Mexico	11	4.49	13	5.20	28	7.43	5	2.06	4	1.46
New York	10	3.12	17	6.27	14	4.19	11	3.66	8	3.13
North Carolina	4	4.01	1	.94	4	3.43	8	8.05	0	....
Ohio	0	....	1	3.23	0	....	0	....	2	7.55
Oklahoma	0	....	2	3.70	1	1.56	3	5.03	4	4.68
Oregon	2	1.43	1	.95	3	2.22	1	.78	2	1.87
Pennsylvania	1	1.16	2	2.62	0	....	0	....	1	2.60
South Carolina	0	....	0	....	0	....	0	....	0	....
South Dakota	8	3.18	6	3.06	8	3.83	4	2.17	6	3.34
Tennessee	10	2.25	12	3.45	10	3.17	18	5.53	8	2.84
Texas	0	....	0	....	1	2.86	0	....	1	3.40
Utah	49	6.36	41	4.85	36	4.59	29	4.97	23	4.22
Vermont	0	....	2	11.05	1	6.99	0	....	1	10.20
Virginia	6	1.51	4	1.59	12	4.62	2	1.07	1	.51
Washington	3	1.91	4	3.06	4	3.07	0	....	4	5.59
Wisconsin	3	1.05	22	5.74	11	2.54	11	4.27	8	3.02
Wyoming	0	....	4	6.04	0	....	0	....	2	5.18
Other States	1	17.24	....	....	1	2.04	1	2.54	0	....
Total[c]	**695**	**4.19**	**661**	**3.91**	**683**	**3.57**	**559**	**3.54**	**553**	**3.64**

[a] Not reported.
[b] Placer mines not included. Snow slide killed 9 men.
[c] For corresponding number of men employed, see Table 26, p. 83.

SCOPE OF STATISTICS.

The following tables giving the accidents in the metal mines in the United States for the calendar year 1915 have been compiled by the Bureau of Mines from reports received directly from the operators. In the compilation of these figures the size of the mines was not considered, and the figures cover reports from prospectors, development companies, and producing mines.

Although the Bureau of Mines is authorized to collect data relating to accidents at mines, there is no Federal law compelling operators to render such reports. However, the majority of the operators promptly and cheerfully replied to the bureau's requests for information. The tabulated statistics represent 4,322 operators who actually worked their mines during the year. As far as can be ascertained, all of the large companies made out detailed reports, so that, measured on the basis of production, the statistics are representative of the industry.

The tables in the following pages are arranged so as to represent five divisions of the mining industry, as follows:

Copper mines.—All of the copper mines and prospects that were reported in operation in the various copper-producing States are included in this group. The list represents 548 operators.

Gold, silver, and miscellaneous metal mines.—Under this heading are the gold mines, both lode and placer, silver mines, lead-silver mines, gold-silver mines, the lead and zinc mines other than those in the Mississippi Valley, and mines working ores of quicksilver, manganese, tungsten, vanadium, chromium, etc. Pyrite mines are included in this class, as the cinder is used in some of the metallurgical works for its iron and copper content. Bauxite mines, because bauxite is the principal source of metallic aluminum, are classed under this division. This group represents 3,120 operators, who reported their mines as active part or all of the year.

Iron mines.—All of the important iron mines, representing 191 operators, are given in the tables showing statistics relating to iron mining.

Lead and zinc mines (*Mississippi Valley*).—The lead and zinc mines, represented by reports of 241 operators of that region, are grouped together as representing an industry in which general conditions are similar.

Nonmetallic mineral mines.—The nonmetallic mineral mines, representing 222 operators, include those for asbestos, asphaltum, barite, feldspar, garnet, graphite, gypsum, kaolin, mica, phosphate rock, quartz, talc, salt, and soapstone. Coal mines are not included in this classification.

ACKNOWLEDGMENTS.

The acknowledgments of the bureau are due to the State mine inspectors and other officials of the various State mining departments, who have rendered invaluable assistance in verifying and correcting from their records, often at the expense of considerable time and trouble, the data reported to the bureau by the operators.

Special mention should be made of the assistance rendered by the mine inspectors of Alaska, Arizona, Colorado, Idaho, Missouri, Nevada, New York, and South Dakota, and the Industrial Accident Commission of California. To both the operators and the State mining officilas the Bureau of Mines extends its thanks for their hearty cooperation. The author acknowledges the assistance rendered by E. S. Boalich and W. W. Adams. The latter prepared the chapter on State laws relating to reports of accidents.

PUBLICATION OF ACCIDENT STATISTICS.

In publishing these statistics the Federal Bureau of Mines has no intent of encroaching on the field covered by the annual or biennial reports of State mine inspectors or mining departments. The bureau hopes, however, that the distribution of this information will help to establish a uniform basis for recording and reporting mine accidents, the number of men employed, and the number of days' work performed. When all mine-accident statistics are thus placed on the same basis, the making of comparisons and the drawing of conclusions will be rendered much easier.

As bearing on the difficulties that attend the compilation of comparable figures, attention is called to the fact that a number of States have no inspectors for metal mines and there is a lack of uniformity in the reports issued by the various States that have inspectors. The fiscal years of the States are not uniform, some ending in June, others in September or October, and still others conforming to the calendar year.

Many other features of the reports are not uniform. This is especially noticeable as to the classes of mines the inspection service should cover, as is indicated in the accompanying table. The mines subject to inspection differ; in some States all mines are included, whereas in others only those mines employing 5, 10, or 20 men underground are included. Compensation laws in most States apply to all mines, but in some they are elective at the option of the operator. Hence those operators who do not choose to accept State compensation will not be included in the commission's report, so that the report will not include all mines for the year in question.

In those States having an inspection service the fatality figures given herein were submitted to the various inspectors for verification, and from nearly all the bureau has received hearty cooperation. Only a few of the States collect statistics covering serious injuries, and still fewer give any attention to slight injuries, so that on these points it is impossible to check closely. Although the total number of deaths reported in the various States agrees closely with the inspectors' reports, there is some variation as to the classification.

The Bureau of Mines will be glad to receive suggestions from State inspectors, and from any person interested in mining, as to the form in which the statistics can be presented most effectively and as to the method of making their publication most useful to the mining industry.

CLASSIFICATION OF INJURIES.

Many of the States now have compensation laws, and in order to conform with their classifications the bureau's classification of serious and slight injuries for 1915 is on a 14-day (2-week) basis instead of 20 days, as in previous years. The new classification of injuries includes three types, as follows:

1. Fatal.
2. Serious (time lost, more than 14 days):
    (*a*) Permanent disability.
        Total.
        Partial.
    (*b*) Others.
3. Slight (time lost, 1 to 14 days, inclusive).

Permanent total disability.—Loss of both legs or arms, one leg and one arm, total loss of eyesight, paralysis or other condition permanently incapacitating workman from doing any work of a gainful occupation.

Permanent partial disability.—Loss of one foot, leg, hand, eye, one or more fingers, one or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

ACCIDENT STATISTICS BY GROUPS OF MINES.

COPPER MINES.

The figures given in Tables 2, 4, and 6 are compiled from reports of 548 operators of copper mines employing 47,174 men, of whom 32,421 were employed underground and 14,753 on the surface. Of the 548 operators, 329 were working prospects and small mines in which less than 1,000 days' labor was performed. The other 219 were operators of mines where 1,000 or more days' labor was performed.

The total number of deaths and injuries due to accidents, and the rates per 1,000 employed, as reported are as follows: Deaths, 176, or 3.73 per 1,000 men employed; serious injuries, 3,447 or 73.07 per 1,000; slight injuries, 11,807, or 250.29 per 1,000. Of the total number of fatalities, 143 occurred underground, making the rate 4.41 per 1,000 employed. The number of surface fatalities was 33, or 2.24 per 1,000.

Nonfatal injuries reported by metal-mine operators to State mine inspectors or other State officials.

[1915.]

State.	Mines subject to—		Disability rendering injury reportable to—		Injuries for which compensation is provided.[a]	State inspector's classification of injuries.		Injuries published in inspector's report.
	Inspection law.	Compensation law.[a]	State inspector.	Compensation commission.[a]		Serious.	Slight.	
Alabama	20 men underground.		10 days			30 days	1 to 29 days	Serious.
Alaska	6 employees	5 employees [b]	Serious		Over 14 days			Do.
Arizona	All	All	do	All for which compensation is claimed.	2 weeks			Serious and slight.
California		do.[b]		do	Over 2 weeks			
Colorado	All	4 men [b]	2 days	All	3 weeks			Nonfatal (not defined).
Florida [c]								
Idaho	All		Serious					Serious and slight.
Illinois	do	All [b]	30 days	Over 1 week	Over 6 days	List includes all for which compensation is paid.		All for which compensation is paid.
Kansas	No inspector	do.[b]		All	2 weeks			
Kentucky		6 employees		do	Over 1 week			
Maryland	All	All	All	do	Over 2 weeks	7 days	Less than 7 days	All.
Michigan	do	1 employee [b]	Personal injury	do	2 weeks	2 weeks		2 weeks.
Minnesota	do	All [b]	Serious	All for which compensation is paid.	Over 2 weeks	Fractures, etc		
Missouri	do		3 or 4 days			30 days	Less than 30 days	Serious.
Montana	5 employees		Serious		2 weeks			Do.
Nevada	All employing wage earners.	2 employees [b]	do	All	do			10 days.
New Jersey	All	All [b]	2 weeks	do	Over 2 weeks			
New Mexico	No inspector	No compensation law.						
New York	All	All	All causing incapacity.	All	Over 14 days			All.
North Carolina	11 men	No compensation law.	All					Do.
Oklahoma	All	All	Serious	All	Over 14 days			1 day.
Oregon	3 employees	do	Causing victim to cease work.		Any time			
Pennsylvania		do.[b]		All	Over 14 days			

South Dakota	1 employee		Serious					Serious.
Tennessee	All	No compensation law.	do					Do.
Utah [d]								
Virginia [e]								
Washington	No inspector	All		All	Time not stated			
Wisconsin	do	4 employees [b]		All causing disability.	Over 1 week			
Wyoming	do	All		All	Over 10 days			

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[a] Applies to all mines, including coal mines.

[b] Operator may accept State accident insurance or carry his own.

[c] No inspector; act of June 7, 1913, establishes liability in certain hazardous industries, including "blasting" and "dynamiting." Mines and quarries not mentioned.

[d] No inspector; act of Mar. 16, 1915, authorized appointment of commission to investigate and report on workmen's compensation.

[e] No compensation law; acts of Mar. 3, 1898, Mar. 4, 1898, and Feb. 27, 1906, authorize commissioner of labor to investigate mines and require mine operators to give all "necessary" information. No specific reference to accidents. Act of Mar. 13, 1912, authorizes appointment of inspector for coal mines only.

The seemingly high rates of serious and slight injuries for this group of mines are not so much due to greater hazards as to the fact that the copper mines are worked by well-organized companies practically all of which have a safety department in charge of a competent engineer. The result is that accurate records are kept, and it is believed that the records shown by both the copper and iron mines of the United States represent more nearly the actual hazard in the mining industry than do the records for any other group. One class of injuries in the copper-mining industry that increases the accident rate is due to the character of the ore handled in the Lake Superior district. Much of the rock in this district contains metallic copper and the men receive many cuts and scratches in handling it.

GOLD, SILVER, AND MISCELLANEOUS METAL MINES.

The data on accidents in and about the gold, silver, and miscellaneous metal mines, shown in Tables 2, 4, and 7 are compiled from the reports of 3,120 operators, employing 45,312 men, of whom 29,163 were employed underground and 16,149 on the surface. The number of deaths and injuries due to accidents and the rates per 1,000 employed are as follows: Deaths, 199, or 4.39 per 1,000 men employed; serious injuries, 1,691, or 37.32, per 1,000; slight injuries, 6,686, or 147.55 per 1,000. Of the total number of fatalities, 168 occurred underground, or 5.76 per 1,000 employed underground, and 31 on the surface, or 1.92 per 1,000 employed on the surface.

The rates of serious and slight injuries are low when compared with the corresponding rates at iron and copper mines. The difference may be explained largely by the fact that this group includes many prospects and small mines that keep no records, and many of the mines are in States where there is no inspection and the operators are not required to report accidents. At such mines accidents that are not serious are forgotten, but fatal accidents are remembered and reported. For their own protection the majority of the larger companies operating gold, silver, and lead-silver mines in the West have hospital service and medical aid for their employees and are keeping records that are comparable with those kept by the large iron and copper-mining companies.

IRON MINES.

The figures on accidents at iron mines given in Tables 2, 4, and 8 are compiled from the reports of 191 iron-mine operators, who employed 39,391 men, of whom 23,302 were employed underground and 16,089 on the surface, including those engaged in steam-shovel work. The number of deaths and injuries resulting from accidents in these mines is as follows: Deaths, 103, or 2.61 per 1,000 men employed; serious injuries, 2,251, or 57.15 per 1,000; and slight injuries, 6,086, or 154.50 per 1,000. Of the total number of fatalities, 78 occurred underground, or 3.35 per 1,000 employed underground, and 25 employees were killed while engaged in surface work, making this rate 1.55 per 1,000 employed on the surface.

The injury rates at the iron mines, as at the copper mines, appear high; but, as has been stated, the iron mines are operated by well-organized companies which are conducting a safety campaign and are keeping excellent records of accidents. The accident hazard has not increased, but the records are so well kept that the real hazard of the mining industry is being brought out.

LEAD AND ZINC MINES.

The lead and zinc mines for which data are compiled include those in the Mississippi Valley only. The lead and zinc mines of other States are grouped with "gold, silver, and miscellaneous metal mines" on account of the difficulty of making a distinct classification. In many places, for instance, in the lead-silver mines in the Coeur d'Alene district of Idaho, lead and zinc occur as associated metals in silver ores. The Mississippi Valley lead and zinc mines form a class by themselves and are easily segregated.

The figures given in Tables 2, 4, and 9 are compiled from the reports of 241 operators, employing 12,977 men, of whom 9,493 were employed underground and 3,484 on the surface. Of the 241 operators reporting, 44 operated small mines and prospects at each of which less than 1,000 days' labor was performed. The other 197 were operators of mines where 1,000 or more days' labor was performed.

The total number of deaths and injuries due to accidents as reported is as follows: Deaths, 60, or 4.62 per 1,000 men employed; serious injuries, 363, or 27.97 per 1,000; and slight injuries, 2,298, or 177.08 per 1,000. Of the total number of fatalities, 54 occurred underground, making the rate 5.69 per 1,000 men employed below the surface. The surface fatalities were 6, or 1.72 per 1,000 employed on the surface.

The fatality rate for underground employees in the lead and zinc district is slightly higher than for any other group, except gold, silver, and miscellaneous metal mines. The rate for serious injuries is as high, but the rate for slight injuries is somewhat higher than at iron mines.

NONMETALLIC MINERAL MINES.

The reports of 222 operators of nonmetallic mineral mines are compiled in Tables 2, 4, and 10. These mines employed 7,264 men, of whom 1,844 were employed underground and 5,420 on the surface.

The total number of deaths and injuries due to accidents reported is as follows: Deaths, 15, or 2.06 per 1,000 employed; serious injuries, 99, or 13.63 per 1,000; and slight injuries, 567, or 78.06, per 1,000. When compared with the rates for the copper and iron mines, these ratios seem exceedingly low. The reports received indicate that this difference is largely explainable by the mines being small and not keeping complete records. About 75 per cent of the men are employed on the surface, the hazards being thus reduced to those of quarry operations. The figures for 1915 show a higher injury ratio than for previous years, indicating that the educational campaign is resulting in more complete records being kept.

ACCIDENT STATISTICS, BY STATES.

A compilation of the accident statistics, by States, is given in Tables 3, 5, 11, 12, and 13, representing 4,322 operators employing 152,115 men, of whom 96,223 were employed underground and 55,895 on the surface. The total number of fatalities and serious and slight injuries due to accidents is as follows: Deaths, 553, or 3.64 per 1,000 men employed; total number of injuries, 35,295, or 232.02 per 1,000 employed. Of the total number of fatalities, 451 occurred underground, or at the rate of 4.69 per 1,000 employed underground, and 102 were killed on the surface, or 1.82 per 1,000 employed on the surface.

The great irregularity of the injury ratio in different States is evident. The reason for this difference is shown in Table 13, where extracts from State laws are given.

CAUSES AND DISTRIBUTION OF ACCIDENTS.

In Tables 15 and 25 is given the percentage of deaths and injuries due to any one cause in each group of mines and for all of the mines combined. It will be noted, for instance, that 40.78 per cent of the deaths in lead and zinc mines, 17.08 per cent of the serious injuries, and 11.36 per cent of the slight injuries were due to falls of rock or ore from roof or wall. A similar comparison may be made for any group of mines for any one of the 41 causes enumerated. These tables also show that approximately two-thirds of the total deaths and injuries that occurred in and about metal mines were caused as follows:

Of the fatalities, 38.52 per cent was due to falls of ore or rock from roof, wall, or bank; 15.91 per cent to falling down stope, shaft, winze, or bank; 14.10 per cent to explosives; and 8.68 per cent to haulage systems.

Of the serious injuries, 23 per cent was due to falls of roof, wall, or bank; 16.22 per cent to car and haulage systems; 11.06 per cent to timber and hand tools; and 9.67 per cent to machinery.

Of the slight injuries, 19.50 per cent was due to falls of roof, wall, or bank; 10.89 per cent to car and haulage systems; 11.63 per cent to timber and hand tools; and 9.21 per cent to machinery.

There were no fatalities due to mine fires, as compared with 10 fatalities in 1914, none in 1913, 1 in 1912, and 37 in 1911. The number of fatalities due to falling down shafts was 34, the same as in 1914, as compared with 26 in 1913, 40 in 1912, and 57 in 1911.

TABULATED STATISTICS.

The tables of statistics of metal-mine accidents in the United States during the calendar year 1915 follow.

TABLE 1.—***ALL MINES:*** *Men employed, and number killed and injured per 1,000 employed, by kinds of mines, during the years ended Dec. 31, 1915 and 1914.*

Kind of mine.	Active operators.	Men employed.			Number killed.						Number injured. (Time lost, more than 1 day.)						Widows.	Orphans.
		Underground.	On the surface.	Total.	Underground.[a]	Rate per 1,000 employed.	On the surface.	Rate per 1,000 employed.	**Total, underground and surface.**	Rate per 1,000 employed.	Underground.[a]	Rate per 1,000 employed.	On the surface.	Rate per 1,000 employed.	**Total, underground and surface.**	Rate per 1,000 employed.		
1915.																		
Copper	548	32,421	14,753	47,174	143	4.41	33	2.24	**176**	3.73	12,526	386.35	2,728	184.91	**15,254**	323.36	99	186
Gold, silver, and miscellaneous metal	3,120	29,163	16,149	45,312	168	5.76	31	1.92	**199**	4.39	6,990	239.69	1,387	85.89	**8,377**	184.87	77	133
Iron	191	23,302	16,089	39,391	78	3.35	25	1.55	**103**	2.61	6,631	284.57	1,706	106.04	**8,337**	211.65	67	127
Lead and zinc (Mississippi Valley only)	241	9,493	3,484	12,977	54	5.69	6	1.72	**60**	4.62	2,370	249.66	291	83.52	**2,661**	205.06	23	28
Nonmetallic mineral	222	1,844	5,420	7,264	8	4.34	7	1.29	**15**	2.06	212	114.97	454	83.76	**666**	91.69	9	10
Total or average	**4,322**	**96,223**	**55,895**	**152,118**	**451**	**4.69**	**102**	**1.82**	**553**	**3.64**	**28,729**	**298.57**	**6,566**	**117.47**	**35,295**	**232.02**	**275**	**484**
1914.																		
Copper	585	31,265	13,421	44,686	147	4.70	18	1.34	**165**	3.69	11,039	353.08	2,328	173.46	**13,367**	299.13	69	106
Gold, silver, and miscellaneous metal	3,536	35,432	13,006	48,438	154	4.35	25	1.92	**179**	3.70	4,656	131.40	945	72.66	**5,601**	115.63	60	87
Iron	196	24,847	19,960	44,807	120	4.83	28	1.40	**148**	3.30	6,585	265.02	2,188	109.62	**8,773**	195.80	86	178
Lead and zinc (Mississippi Valley only)	248	7,609	3,326	10,935	37	4.86	3	.90	**40**	3.66	1,475	193.85	276	82.98	**1,751**	160.13	23	53
Nonmetallic mineral	240	2,465	6,784	9,249	8	3.25	19	2.80	**27**	2.92	242	98.17	482	71.05	**724**	78.28	14	18
Total or average	**4,805**	**101,618**	**56,497**	**158,115**	**466**	**4.59**	**93**	**1.65**	**559**	**3.54**	**23,997**	**236.15**	**6,219**	**110.08**	**30,216**	**191.10**	**252**	**442**

[a] Includes shaft accidents.

TABLE 2.—*ALL MINES: Fatalities and injuries, by causes*

NUMBER KILLED.

Kind of mine.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Copper	69	2	4	16	5	13	2	......	5	......
Gold, silver, and miscellaneous metal	49	4	2	37	7	23	5	1	4	......
Iron	42	3	1	6	4	8	3	......	1	......
Lead and zinc (Mississippi Valley)	27	1	......	11	1	1	......	......	......	......
Nonmetallic mineral	4	......	......	2	1	......	......	......	......	......
Total	**191**	**10**	**7**	**72**	**18**	**45**	**10**	**1**	**10**	......
Percentage of grand total killed	34.54	1.81	1.27	13.02	3.25	8.14	1.81	.18	1.81	......
Percentage of class total killed	51.06	2.68	1.87	19.25	4.81	12.03	2.68	.27	2.68	......
Number killed per 1,000 employed underground [a]	1.98	.11	.07	.75	.18	.47	.11	.01	.11	......
NUMBER SERIOUSLY INJURED.										
Copper	834	425	260	49	484	111	79	187	6	13
Gold, silver, and miscellaneous metal	384	133	151	36	163	87	24	98	6	20
Iron	387	220	278	35	392	62	44	108	3	12
Lead and zinc (Mississippi Valley)	62	60	4	18	58	8	......	12	1	7
Nonmetallic mineral	4	7	2	5	11	1	1	3	......	......
Total	**1,671**	**845**	**695**	**143**	**1,108**	**269**	**148**	**408**	**16**	**52**
Percentage of grand total seriously injured	21.28	10.76	8.85	1.82	14.11	3.43	1.89	5.20	.20	.66
Percentage of class total seriously injured	27.18	13.74	11.30	2.33	18.02	4.38	2.41	6.64	.26	.85
Number seriously injured per 1,000 employed underground [a]	17.37	8.78	7.22	1.49	11.51	2.80	1.54	4.24	.17	.54
NUMBER SLIGHTLY INJURED.										
Copper	2,495	1,477	1,029	75	1,009	263	221	775	20	294
Gold, silver, and miscellaneous metal	1,128	815	695	47	598	222	171	515	15	31
Iron	1,043	700	703	41	743	61	117	298	13	36
Lead and zinc (Mississippi Valley)	261	580	79	26	250	29	25	157	5	34
Nonmetallic mineral	25	59	9	10	24	3	......	4	......	2
Total	**4,952**	**3,631**	**2,515**	**199**	**2,624**	**578**	**534**	**1,749**	**53**	**397**
Percentage of grand total slightly injured	18.04	13.23	9.16	.73	9.56	2.11	1.95	6.37	.19	1.45
Percentage of class total slightly injured	22.77	16.70	11.57	.91	12.07	2.66	2.46	8.04	.24	1.82
Number slightly injured per 1,000 employed underground [a]	51.46	37.73	26.14	2.07	27.27	6.01	5.55	18.18	.55	4.12

[a] Casualty rate per 1,000 employed is based on underground employees for underground accidents, and on surface employees for surface accidents.

and kinds of mines, during the year ended Dec. 31, 1915.

NUMBER KILLED.

Underground—Continued.						Shaft.						
Mine fires. 11	Suffocation from natural gases. 12	Inrush of water. 13	Stepping on nail. 14	Other causes. 15	**Total, underground.**	Falling down shafts. 16	Objects falling down shafts. 17	Breaking of cables. 18	Overwinding. 19	Skip or cage. 20	Other causes. 21	**Total, shaft.**
......	....	....	1	2	**119**	8	3	1	1	9	2	**24**
......	2	....	......	....	**134**	19	6	....	......	6	3	**34**
......	1	....	......	1	**70**	2	1	1	......	3	1	**8**
......	....	3	......	....	**44**	5	2	....	......	2	1	**10**
......	....	....	......	....	**7**	....	1	....	......	....	....	**1**
......	**3**	**3**	**1**	**3**	**374**	**34**	**13**	**2**	**1**	**20**	**7**	**77**
......	.54	.54	.18	.54	67.63	6.15	2.35	.36	.18	3.62	1.27	13.93
......	.80	.80	.27	.80	100.00	44.15	16.88	2.60	1.30	25.98	9.09	100.00
......	.03	.03	.01	.03	3.89	.35	.14	.02	.01	.21	.07	.80

NUMBER SERIOUSLY INJURED.

Mine fires. 11	Suffocation from natural gases. 12	Inrush of water. 13	Stepping on nail. 14	Other causes. 15	**Total, underground.**	Falling down shafts. 16	Objects falling down shafts. 17	Breaking of cables. 18	Overwinding. 19	Skip or cage. 20	Other causes. 21	**Total, shaft.**
8	3	....	15	290	**2,764**	11	19	....	......	28	28	**86**
9	5	1	20	189	**1,326**	13	9	1	1	31	11	**66**
1	5	....	11	173	**1,731**	5	21	....	......	33	20	**79**
3	2	3	7	45	**290**	2	11	....	1	10	4	**28**
......	....	....	1	2	**37**	....	1	....	......	....	....	**1**
21	**15**	**4**	**54**	**699**	**6,148**	**31**	**61**	**1**	**2**	**102**	**63**	**260**
.27	.19	.05	.69	8.91	78.31	.39	.78	.01	.03	1.30	.80	3.31
.34	.24	.06	.88	11.37	100.00	11.92	23.46	.39	.77	39.23	24.23	100.00
.22	.16	.04	.56	7.26	63.90	.32	.63	.01	.02	1.06	.66	2.70

NUMBER SLIGHTLY INJURED.

Mine fires. 11	Suffocation from natural gases. 12	Inrush of water. 13	Stepping on nail. 14	Other causes. 15	**Total, underground.**	Falling down shafts. 16	Objects falling down shafts. 17	Breaking of cables. 18	Overwinding. 19	Skip or cage. 20	Other causes. 21	**Total, shaft.**
4	15	....	212	1,590	**9,479**	15	78	1	......	33	70	**197**
5	31	12	192	988	**5,465**	8	36	1	......	53	35	**133**
......	6	....	120	791	**4,672**	6	49	1	......	47	46	**149**
12	11	18	106	365	**1,958**	1	45	1	......	23	24	**94**
......	4	....	2	29	**171**	....	2	....	......	1	....	**3**
21	**67**	**30**	**632**	**3,763**	**21,745**	**30**	**210**	**4**	......	**157**	**175**	**576**
.08	.24	.11	2.30	13.71	79.23	.11	.77	.01	......	.57	.64	2.10
.10	.31	.14	2.91	17.30	100.00	5.21	36.46	.69	......	27.26	30.38	100.00
.22	.70	.31	6.57	39.11	225.99	.31	2.18	.04	......	1.63	1.82	5.98

TABLE 2.—*ALL MINES: Fatalities and injuries, by causes and*

NUMBER KILLED.

Kind of mine.	Surface (shops and power plants).									
	Mine cars, mine locomotives, or aerial trams.	Railway cars and locomotives.	Run or fall of ore in or from ore bins.	Falls of persons.	Stepping on nail.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Other causes.	**Total, surface.**
	22	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	
Copper	1	3	.....	2	.....	.....	.....	1	17	**24**
Gold, silver, and miscellaneous metal	2	1	.....	.....	.....	.....	1	5	2	**11**
Iron	1	2	1	.....	.....	.....	.....	.....	3	**7**
Lead and zinc (Mississippi Valley)	.....	.....	.....	1	.....	.....	.....	.....	3	**4**
Nonmetallic mineral	.....	1	1	.....	.....	.....	.....	.....	.....	**2**
Total	**4**	**7**	**2**	**3**	.....	.....	**1**	**6**	**25**	**48**
Percentage of grand total killed	.72	1.27	.36	.54	.....	.....	.18	1.09	4.52	8.68
Percentage of class total killed	8.34	14.58	4.17	6.25	.....	.....	2.08	12.50	52.08	100.00
Number killed per 1,000 employed on the surface[a]	.07	.13	.03	.05	.....	.....	.02	.11	.45	.86

NUMBER SERIOUSLY INJURED.

Kind of mine.	22	23	24	25	26	27	28	29	30	Total, surface.
Copper	22	12	7	53	9	65	1	53	199	**421**
Gold, silver, and miscellaneous metal	25	6	8	35	10	14	6	37	68	**209**
Iron	23	7	4	35	6	35	1	32	89	**232**
Lead and zinc (Mississippi Valley)	1	4	2	3	3	3	3	10	14	**43**
Nonmetallic mineral	.....	2	.....	2	3	3	.....	4	10	**24**
Total	**71**	**31**	**21**	**128**	**31**	**120**	**11**	**136**	**380**	**929**
Percentage of grand total seriously injured	.91	.39	.27	1.63	.39	1.53	.14	1.73	4.84	11.83
Percentage of class total seriously injured	7.64	3.34	2.26	13.78	3.34	12.92	1.18	14.64	40.90	100.00
Number seriously injured per 1,000 employed on the surface[a]	1.27	.55	.38	2.29	.55	2.15	.20	2.43	6.80	16.62

NUMBER SLIGHTLY INJURED.

Kind of mine.	22	23	24	25	26	27	28	29	30	Total, surface.
Copper	40	17	27	81	58	125	4	81	590	**1,023**
Gold, silver, and miscellaneous metal	56	9	13	79	57	118	27	79	274	**712**
Iron	31	20	13	78	45	140	4	61	324	**716**
Lead and zinc (Mississippi Valley)	13	5	22	21	39	32	2	17	91	**242**
Nonmetallic mineral	7	5	6	25	36	41	1	20	110	**251**
Total	**147**	**56**	**81**	**284**	**235**	**456**	**38**	**258**	**1,389**	**2,944**
Percentage of grand total slightly injured	.53	.20	.30	1.04	.86	1.66	.14	.94	5.06	10.73
Percentage of class total slightly injured	4.99	1.90	2.75	9.65	7.98	15.49	1.29	8.77	47.18	100.00
Number slightly injured per 1,000 employed on the surface[a]	2.63	1.00	1.45	5.08	4.20	8.16	.68	4.62	24.85	52.67

[a] Casualty rate per 1,000 employed is based on underground employees for underground accidents, and on surface employees for surface accidents.

kinds of mines, during the year ended Dec. 31, 1915—Continued.

NUMBER KILLED.

Open pit.												Grand total.				
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	**Total, open pit.**					
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**		**1915**	1914	1913	1912	1911
2	......	6	......	1	......	....	......	....	......	......	**9**	**176**	165	236	239	**238**
6	5	1	......	3	......	....	2	2	......	1	**20**	**199**	179	210	176	**193**
2	1	11	1	1	1	....	......	....	......	1	**18**	**103**	148	165	172	**197**
......	......	1	......	......	......	....	......	....	......	1	**2**	**60**	40	42	54	**43**
2	......	......	......	1	......	....	......	1	......	1	**5**	**15**	27	30	20	**24**
12	**6**	**19**	**1**	**6**	**1**	....	**2**	**3**	......	**4**	**54**	**553**	**559**	**683**	**661**	**695**
2.17	1.09	3.43	.18	1.09	.18	....	.36	.54	......	.72	9.76	100.00	......	......	......	......
22.22	11.11	35.19	1.85	11.11	1.85	....	3.70	5.56	......	7.41	100.00	......	......	......	......	......
.21	.11	.34	.02	.11	.02	....	.03	.05	......	.07	.96	**3.64**	3.54	3.57	**3.91**	**4.19**

NUMBER SERIOUSLY INJURED.

77	1	21	4	11	1	....	5	....	6	50	**176**	**3,447**	2,037	2,195	1,807	1,326
8	2	......	......	11	......	1	25	....	17	26	**90**	**1,691**	911	632	613	540
48	7	35	14	17	1	3	4	....	26	54	**209**	**2,251**	1,851	2,820	1,800	2,032
......	......	2	......	......	......	....	......	....	......	......	**2**	**363**	146	91	147	177
2	2	6	......	3	......	....	9	....	4	11	**37**	**99**	128	152	135	94
135	**12**	**64**	**18**	**42**	**2**	**4**	**43**	....	**53**	**141**	**514**	**7,851**	**5,073**	**5,890**	**4,502**	**4,169**
1.72	.15	.81	.23	.53	.03	.05	.55	....	.68	1.80	6.55	100.00	......	......	......	......
26.26	2.34	12.45	3.50	8.17	.39	.78	8.37	....	10.31	27.43	100.00	......	......	......	......	......
2.42	.21	1.15	.32	.75	.03	.07	.77	....	.95	2.53	9.20	51.61	32.08	30.79	26.61	25.12

NUMBER SLIGHTLY INJURED.

266	22	92	48	113	2	2	30	2	70	461	**1,108**	**11,807**	11,330	11,168	11,830	9,016
37	5	2	......	44	3	....	66	5	52	162	**376**	**6,686**	4,690	3,223	3,180	3,078
78	6	59	28	50	2	3	4	....	87	232	**549**	**6,086**	6,922	10,653	8,707	8,690
4	......	......	......	......	......	....	......	....	......	......	**4**	**2,298**	1,605	1,345	1,849	1,311
16	1	12	1	6	1	6	24	3	14	58	**142**	**567**	596	692	666	313
401	**34**	**165**	**77**	**213**	**8**	**11**	**124**	**10**	**223**	**913**	**2,179**	**27,444**	**25,143**	**27,081**	**26,232**	**22,408**
1.46	.12	.60	.28	.78	.03	.04	.45	.04	.81	3.33	7.94	100.00	......	......	......	......
18.40	1.56	7.57	3.53	9.78	.37	.51	5.69	.46	10.23	41.90	100.00	......	......	......	......	......
7.17	.61	2.95	1.38	3.81	.14	.20	2.22	.18	3.99	16.33	38.98	180.41	159.02	141.58	155.04	135.01

TABLE 3.—*ALL MINES: Fatalities, by causes*

State.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	2	3	4	5	6	7	8	9	10
Alabama	6			1						
Alaska	9			3	1		1			
Arizona	12		3	6	2	5				
Arkansas				1						
California	6	3		9		2	1		2	
Colorado	15		1	7		13	1		1	
Connecticut										
Florida										
Georgia	1									
Idaho	10			6	4		1		2	
Illinois				1						
Iowa	2									
Kansas										
Kentucky										
Maine										
Maryland										
Massachusetts										
Michigan	50	1	1	6	1	11	5		2	
Minnesota	13	1	1	2		1				
Missouri	19	1		9	1	1				
Montana	15	1	1	5	2	5			3	
Nevada	2			5		4				
New Hampshire										
New Jersey	5			1	1					
New Mexico				2		1				
New York	3	1		1	2					
North Carolina										
Ohio				2						
Oklahoma	4									
Oregon										
Pennsylvania										
South Carolina										
South Dakota	2	1				1				
Tennessee	2	1			1		1			
Texas										
Utah	10			1	1	1		1		
Vermont					1					
Virginia										
Washington				4						
Wisconsin	5									
Wyoming					1					
Other States										
Total, 1915	**191**	**10**	**7**	**72**	**18**	**45**	**10**	**1**	**10**	
Total, 1914	185	7	3	49	31	48	5	3	8	1
Total, 1913	220	10	8	77	35	52	10		16	4
Total, 1912	212	2	6	73	35	43	10	2	19	2
Total, 1911	191		10	62	20	47	14		15	10

and States, during the year ended Dec. 31, 1915.

Underground—Continued.						Shaft.						
Mine fires. 11	Suffocation from natural gases. 12	Inrush of water. 13	Stepping on nail. 14	Other causes. 15	**Total, underground.**	Falling down shafts. 16	Objects falling down shafts. 17	Breaking of cables. 18	Overwinding. 19	Skip or cage. 20	Other causes. 21	**Total, shaft.**
......	......	......	......	......	**7**	......	......	......	......	......	......	......
......	......	......	......	......	**14**	2	1	......	......	1	......	**4**
......	......	......	......	1	**29**	4	......	......	......	6	1	**11**
......	......	......	......	......	**1**	......	......	......	......	......	......	......
......	......	......	......	......	**23**	5	4	......	......	1	1	**11**
......	......	......	......	......	**38**	6	1	......	......	1	......	**8**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	**1**	......	......	......	......	......	......	......
......	......	......	......	......	**23**	......	......	......	......	......	......	......
......	......	......	......	......	**1**	......	1	......	......	1	......	**2**
......	......	......	......	......	**2**	......	......	......	......	......	......	......
......	......	......	......	......	......	......	1	......	......	......	......	**1**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	1	......	......	......	**78**	4	2	1	......	5	3	**15**
......	......	......	......	1	**19**	1	......	......	......	......	......	**1**
......	......	3	......	......	**34**	5	......	......	......	1	......	**6**
......	2	......	1	......	**35**	2	3	......	1	......	......	**6**
......	......	......	......	......	**11**	1	......	......	......	1	1	**3**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	**7**	......	......	......	......	1	......	**1**
......	......	......	......	......	**3**	......	......	......	......	......	......	......
......	......	......	......	......	**7**	......	......	1	......	......	......	**1**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	**2**	......	......	......	......	......	......	......
......	......	......	......	......	**4**	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	**4**	2	......	......	......	......	......	**2**
......	......	......	......	......	**5**	1	......	......	......	1	......	**2**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	1	**15**	1	......	......	......	......	......	**1**
......	......	......	......	......	**1**	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	**4**	......	......	......	......	......	......	......
......	......	......	......	......	**5**	......	......	......	......	1	1	**2**
......	......	......	......	......	**1**	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	**3**	**3**	**1**	**3**	**374**	**34**	**13**	**2**	**1**	**20**	**7**	**77**
10	1	8	......	7	**366**	34	10	2	......	43	11	**100**
......	3	......	......	23	**458**	26	15	2	3	34	10	**90**
1	4	5	......	8	**422**	40	12	2	......	37	9	**100**
37	8	12	......	10	**436**	57	18	4	......	......	27	**106**

TABLE 3.—*ALL MINES: Fatalities, by causes*

State.	Surface.									
	Mine cars, mine locomotives, or aerial trams.	Railway cars and locomotives.	Run or fall of ore in or from ore bins.	Falls of persons.	Stepping on nail.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Other causes.	**Total, surface.**
	22	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	
Alabama									1	**1**
Alaska								1		**1**
Arizona								1		**1**
Arkansas										
California		3						1	2	**6**
Colorado	1						1			**2**
Connecticut										
Florida										
Georgia										
Idaho	1							1		**2**
Illinois										
Iowa										
Kansas									1	**1**
Kentucky										
Maine										
Maryland										
Massachusetts										
Michigan		1	1	1					3	**6**
Minnesota		2								**2**
Missouri									2	**2**
Montana	1			1				1	[a]16	**19**
Nevada								1		**1**
New Hampshire										
New Jersey										
New Mexico										
New York										
North Carolina										
Ohio										
Oklahoma										
Oregon										
Pennsylvania										
South Carolina										
South Dakota										
Tennessee										
Texas		1								**1**
Utah										
Vermont										
Virginia	1									**1**
Washington										
Wisconsin				1						**1**
Wyoming			1							**1**
Other States										
Total, 1915	**4**	**7**	**2**	**3**			**1**	**6**	**25**	**48**
Total, 1914	3	7	5	4			6	4	8	**37**
Total, 1913	9	4	2	5	1		5	11	12	**49**
Total, 1912	6	5	2	6			5	11	24	**59**
Total, 1911	4	8	3				2	8	42	**67**

[a] Killed by explosion of gelatine.

and States, during the year ended Dec. 31, 1915—Continued.

Open pit.												Grand total.				
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	**Total, open pit.**					
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**		**1915**	1914	1913	1912	1911
1	......	2	......	......	1	......	......	......	......	......	**4**	**12**	25	22	33	10
1	1	......	......	1	......	......	......	......	......	......	**3**	**22**	19	25	21	....
....	......	......	......	......	......	......	......	......	......	......	......	**41**	63	86	67	70
....	......	......	......	......	......	......	......	......	......	......	......	**1**	......	......	1	2
1	4	......	......	1	......	......	2	......	......	1	**9**	**49**	41	52	40	38
....	......	1	......	......	......	......	......	......	......	......	**1**	**49**	47	44	48	43
....	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	9
....	......	......	......	1	......	......	......	1	......	1	**3**	**3**	10	14	6	
....	......	......	......	......	......	......	......	......	......	......	......	**1**	1	1	......	2
....	......	......	......	......	......	......	......	......	......	......	......	**25**	25	24	29	23
....	......	......	......	......	......	......	......	......	......	......	......	**3**	......	1	1	1
....	......	......	......	......	......	......	......	......	......	......	......	**2**	......	......	......	1
....	......	......	......	......	......	......	......	......	......	......	......	**2**	1	4	2	2
....	......	......	......	......	......	......	......	......	......	......	......	......	2	......	1	3
....	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	....
....	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	....
....	......	......	......	......	......	......	......	......	......	......	......	**99**	99	82	96	134
1	1	9	1	1	......	......	......	......	......	1	**14**	**36**	43	63	50	76
....	......	1	......	......	......	......	......	......	......	1	**2**	**44**	25	34	30	38
....	......	......	......	......	......	......	......	2	......	......	**2**	**62**	39	64	50	62
2	......	......	......	1	......	......	......	......	......	......	**3**	**18**	22	25	34	50
....	......	......	......	......	......	......	......	......	......	......	......	......	......	......	1	....
....	......	......	......	1	......	......	......	......	......	......	**1**	**9**	4	8	13	23
....	......	1	......	......	......	......	......	......	......	......	**1**	**4**	5	28	13	11
....	......	......	......	......	......	......	......	......	......	......	......	**8**	11	14	17	10
....	......	......	......	......	......	......	......	......	......	......	......	......	8	4	1	4
....	......	......	......	......	......	......	......	......	......	......	......	**2**	......	......	1	....
....	......	......	......	......	......	......	......	......	......	......	......	**4**	3	1	2	....
2	......	......	......	......	......	......	......	......	......	......	**2**	**2**	1	3	1	2
1	......	......	......	......	......	......	......	......	......	......	**1**	**1**	......	......	2	1
....	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	....
....	......	......	......	......	......	......	......	......	......	......	......	**6**	4	8	6	8
1	......	......	......	......	......	......	......	......	......	......	**1**	**8**	18	10	12	10
....	......	......	......	......	......	......	......	......	......	......	......	**1**	......	1	......	....
2	......	5	......	......	......	......	......	......	......	......	**7**	**23**	29	36	41	49
....	......	......	......	......	......	......	......	......	......	......	......	**1**	......	1	2	....
....	......	......	......	......	......	......	......	......	......	......	......	**1**	2	12	4	6
....	......	......	......	......	......	......	......	......	......	......	......	**4**	......	4	4	3
....	......	......	......	......	......	......	......	......	......	......	......	**8**	11	11	22	3
....	......	......	......	......	......	......	......	......	......	......	......	**2**	......	......	4	....
....	......	......	......	......	......	......	......	......	......	......	......	......	1	1	......	1
12	**6**	**19**	**1**	**6**	**1**	......	**2**	**3**	......	**4**	**54**	**553**	......	......	......	....
18	11	9	1	4	1	......	5	3	......	**4**	**56**	......	559	......	......	....
17	12	30	2	1	1	......	10	5	......	**8**	**86**	......	......	683	......	....
16	21	20	4	3	2	......	6	1	......	**7**	**80**	......	......	......	661	....
35	16	21	1	3	1	......	3	......	......	**6**	**86**	......	......	......	......	695

TABLE 4.—***FATALITIES:*** *By kinds of*

COPPER MINES.

State.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	2	3	4	5	6	7	8	9	10
Alaska	2	......	......	1	......	......	......	......	......	......
Arizona	12	......	3	5	2	2	......	......	......	......
California	......	......	......	1	......	1	......	......	1	......
Idaho	......	......	......	......	......	......	......	......	......	......
Michigan	34	......	1	4	1	4	2	......	1	......
Montana	14	1	......	4	2	4	......	......	3	......
Nevada	1	......	......	......	......	......	......	......	......	......
New Mexico	......	......	......	......	......	1	......	......	......	......
Utah	5	......	......	......	......	1	......	......	......	......
Washington	......	......	......	1	......	......	......	......	......	......
Other States	1	1	......	......	......	......	......	......	......	......
Total, 1915	**69**	**2**	**4**	**16**	**5**	**13**	**2**	......	**5**	......
Total, 1914	57	2	1	14	10	22	4	1	5	......
Total, 1913	76	2	1	23	20	25	6	......	6	......
Total, 1912	87	......	4	21	9	16	6	1	9	......
Total, 1911	82	......	6	18	5	19	6	......	6	3

GOLD, SILVER, AND MISCELLANEOUS METAL MINES.

State.	1	2	3	4	5	6	7	8	9	10
Alaska	7	......	......	2	1	......	1	......	......	......
Arizona	......	......	......	1	......	3	......	......	......	......
California	6	3	......	8	......	1	1	......	1	......
Colorado	13	......	1	7	......	13	1	......	1	......
Georgia	1	......	......	......	......	......	......	......	......	......
Idaho	10	......	......	6	4	......	1	......	2	......
Montana	1	......	1	1	......	1	......	......	......	......
Nevada	1	......	......	5	......	4	......	......	......	......
New Mexico	......	......	......	2	......	......	......	......	......	......
North Carolina	......	......	......	......	......	......	......	......	......	......
Oregon	......	......	......	......	......	......	......	......	......	......
South Dakota	2	1	......	......	......	1	......	......	......	......
Tennessee	......	......	......	......	1	......	1	......	......	......
Utah	5	......	......	1	1	......	......	1	......	......
Virginia	......	......	......	......	......	......	......	......	......	......
Washington	......	......	......	3	......	......	......	......	......	......
Wyoming	......	......	......	......	......	......	......	......	......	......
Other States	3	......	......	1	......	......	......	......	......	......
Total, 1915	**49**	**4**	**2**	**37**	**7**	**23**	**5**	**1**	**4**	......
Total, 1914	52	1	......	22	6	21	1	2	3	......
Total, 1913	68	1	3	35	2	21	2	......	5	4
Total, 1912	49	1	1	27	7	17	2	......	5	......
Total, 1911	40	......	2	24	7	18	6	......	7	5

mines, causes, and States, during the year ended Dec. 31, 1915.

COPPER MINES.

Underground—Continued.						Shaft.						
Mine fires.	Suffocation from natural gases.	Inrush of water.	Stepping on nail.	Other causes.	**Total, underground.**	Falling down shafts.	Objects falling down shafts.	Breaking of cables.	Overwinding.	Skip or cage.	Other causes.	**Total, shaft.**
11	12	13	14	15		16	17	18	19	20	21	
					3							
				1	25	4				4		8
					3							
					47	3	1	1		4	2	11
			1		29	1	2		1			4
					1							
					1							
				1	7							
					1							
					2					1		1
			1	2	119	8	3	1	1	9	2	24
2				1	119	8	2			15	3	28
				12	171	9	7		1	9	6	32
	1			3	157	11	2			14	1	28
12	2			1	160	17	5				17	39

GOLD, SILVER, AND MISCELLANEOUS METAL MINES.

					11	2				1		3
					4					2	1	3
					20	5	4			1	1	11
					36	6	1			1		8
					1							
					23							
	2				6	1	1					2
					10	1				1	1	3
					2							
					4	2						2
					2	1						1
					8	1						1
					3							
					4							
	2				134	19	6			6	3	34
4	1			3	116	13	2	2		19	2	38
	3			6	150	10	5			13	2	30
1	3			1	114	16	2	2		10	3	33
17	5			2	133	16	8	3			3	30

TABLE 4.—***FATALITIES:*** *By kinds of mines, causes,*

COPPER MINES.

State.	Surface.									
	Mine cars, mine locomotives, or aerial trams.	Railway cars and locomotives.	Run or fall of ore in or from ore bins.	Falls of persons.	Stepping on nail.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Other causes.	**Total, surface.**
	22	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	
Alaska										
Arizona								1		**1**
California		2								**2**
Idaho										
Michigan		1		1					1	**3**
Montana	1			1		16				**18**
Nevada										
New Mexico										
Utah										
Washington										
Other States										
Total, 1915	**1**	**3**		**2**		**16**		**1**	**1**	**24**
Total, 1914	2	2		1					3	**8**
Total, 1913	1	2					2	3	1	**9**
Total, 1912	1	5		4			3	3	15	**31**
Total, 1911		3	1				1	3	14	**22**

GOLD, SILVER, AND MISCELLANEOUS METAL MINES.

State.	22	23	24	25	26	27	28	29	30	Total, surface.
Alaska								1		**1**
Arizona										
California		1						1	2	**4**
Colorado	1						1			**2**
Georgia										
Idaho	1							1		**2**
Montana								1		**1**
Nevada								1		**1**
New Mexico										
North Carolina										
Oregon										
South Dakota										
Tennessee										
Utah										
Virginia										
Washington										
Wyoming										
Other States										
Total, 1915	**2**	**1**					**1**	**5**	**2**	**11**
Total, 1914		2	2				3	2	2	**11**
Total, 1913	2	1		2	1		1	5	6	**18**
Total, 1912	3						1	5	3	**12**
Total, 1911	3		1				1	3	17	**25**

and States, during the year ended Dec. 31, 1915—Continued.

COPPER MINES.

Open pit.												Grand total.				
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	Total, open pit.					
31	32	33	34	35	36	37	38	39	40	41		1915	1914	1913	1912	1911
.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1	4	2	.....	12	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	34	57	74	60	61
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	3	9	9	2
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	3	1	3
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	61	40	34	44	63
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	51	33	60	48	50
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	6	10	18	12
.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1	2	1	16	8	4
2	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	7	14	14	25	27	32
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	2	1	2
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	6	3	11	9
2	.....	6	.....	1	.....	.....	.....	.....	.....	.....	9	176	.....	.....	.....	.....
1	6	3	.....	.....	.....	.....	.....	.....	.....	.....	10	.....	165	.....	.....	.....
4	6	12	.....	.....	.....	.....	2	.....	.....	.....	24	.....	.....	236	.....	.....
3	13	4	2	.....	.....	.....	.....	.....	.....	1	23	.....	.....	.....	239	.....
7	5	2	.....	1	.....	.....	2	.....	.....	.....	17	.....	.....	.....	.....	238

GOLD, SILVER, AND MISCELLANEOUS METAL MINES.

31	32	33	34	35	36	37	38	39	40	41	Total, open pit.	1915	1914	1913	1912	1911
1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	17	17	25	9	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	6	12	7	8
1	4	.....	.....	1	.....	.....	2	.....	.....	1	9	44	37	42	31	36
.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1	47	45	44	46	43
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	25	22	21	28	20
.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	2	11	6	4	2	12
2	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	3	17	16	15	16	37
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2	9	3	4
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	2	1	2
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2	1	3	1	2
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	4	8	6	8
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	3	3	2	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9	15	9	12	17
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	7	2	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	2	3	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1	5	1	4	7	3
6	5	1	.....	3	.....	.....	2	2	.....	1	20	199	.....	.....	.....	.....
3	3	1	.....	2	1	.....	1	2	.....	1	14	.....	179	.....	.....	.....
1	2	1	.....	.....	1	.....	3	2	.....	2	12	.....	.....	210	.....	.....
5	1	4	2	1	.....	.....	1	1	.....	2	17	.....	.....	.....	176	.....
3	.....	.....	.....	1	.....	.....	.....	.....	.....	1	5	.....	.....	.....	.....	193

TABLE 4.—***FATALITIES:*** *By kinds of mines, causes,*

IRON MINES.

State.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	2	3	4	5	6	7	8	9	10
Alabama	6	......	......	1	......	......	......	......	......	......
Michigan	16	1	......	2	......	7	3	......	1	......
Minnesota	13	1	1	2	......	1	......	......	......	......
Missouri	......	......	......	......	......	......	......	......	......	......
New Jersey	2	......	......	......	1	......	......	......	......	......
New York	2	1	......	1	2	......	......	......	......	......
Pennsylvania	......	......	......	......	......	......	......	......	......	......
Tennessee	1	......	......	......	......	......	......	......	......	......
Virginia	......	......	......	......	......	......	......	......	......	......
Wisconsin	1	......	......	......	......	......	......	......	......	......
Other States	1	......	......	......	1	......	......	......	......	......
Total, 1915	**42**	**3**	**1**	**6**	**4**	**8**	**3**	......	**1**	......
Total, 1914	51	3	1	8	13	5	......	......	......	......
Total, 1913	52	7	3	11	12	4	2	......	4	......
Total, 1912	55	1	1	15	17	9	1	1	2	2
Total, 1911	45	......	1	11	6	10	2	......	......	2

LEAD AND ZINC MINES.

State.	1	2	3	4	5	6	7	8	9	10
Arkansas	......	......	......	1	......	......	......	......	......	......
Illinois	......	......	......	1	......	......	......	......	......	......
Kansas	......	......	......	......	......	......	......	......	......	......
Missouri	19	1	......	9	1	1	......	......	......	......
Oklahoma	4	......	......	......	......	......	......	......	......	......
Wisconsin	4	......	......	......	......	......	......	......	......	......
Other States	......	......	......	......	......	......	......	......	......	......
Total, 1915	**27**	**1**	......	**11**	**1**	**1**	......	......	......	......
Total, 1914	20	1	1	4	......	......	......	......	......	1
Total, 1913	16	......	1	7	1	1	......	......	1	......
Total, 1912	18	......	......	9	1	1	1	......	3	......
Total, 1911	18	......	1	3	2	......	......	......	2	......

NONMETALLIC MINERAL MINES.

State.	1	2	3	4	5	6	7	8	9	10
All States, 1915	**4**	......	......	**2**	**1**	......	......	......	......	......
All States, 1914	5	......	......	1	2	......	......	......	......	......
All States, 1913	8	......	......	1	......	1	......	......	......	......
All States, 1912	3	......	......	1	1	......	......	......	......	......
All States, 1911	6	......	......	6	......	......	......	......	......	......

and States, during the year ended Dec. 31, 1915—Continued.

IRON MINES.

Underground—Continued.						Shaft.						
Mine fires.	Suffocation from natural gases.	Inrush of water.	Stepping on nail.	Other causes.	**Total, underground.**	Falling down shafts.	Objects falling down shafts.	Breaking of cables.	Overwinding.	Skip or cage.	Other causes.	**Total, shaft.**
11	12	13	14	15		16	17	18	19	20	21	
......	......	......	......	......	7	......	......	......	......	......	......	......
......	1	......	......	......	31	1	1	......	......	1	1	4
......	......	......	......	1	19	1	......	......	......	......	......	1
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	3	......	......	......	......	1	......	1
......	......	......	......	......	6	......	......	1	......	......	......	1
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	1	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	1	......	......	......	......	1	......	1
......	......	......	......	......	2	......	......	......	......	......	......	......
......	1	......	......	1	70	2	1	1	......	3	1	8
2	......	8	......	2	93	10	4	......	......	7	6	27
......	......	......	......	3	98	6	2	2	1	11	2	24
......	......	5	......	2	111	7	4	......	......	13	1	25
8	1	12	......	5	103	23	3	1	......	......	6	33

LEAD AND ZINC MINES.

......	......	......	......	......	1	......	......	......	......	......	......	......
......	......	......	......	......	1	......	1	......	......	1	......	2
......	......	......	......	......	......	......	1	......	......	......	......	1
......	......	3	......	......	34	5	......	......	......	1	......	6
......	......	......	......	......	4	......	......	......	......	......	......	......
......	......	......	......	......	4	......	......	......	......	......	1	1
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	3	......	......	44	5	2	......	......	2	1	10
2	......	......	......	1	30	3	2	......	......	2	......	7
......	......	......	......	1	28	1	1	......	1	1	......	4
......	......	......	......	2	35	5	4	......	......	......	4	13
......	......	......	......	2	28	1	2	......	......	......	1	4

NONMETALLIC MINERAL MINES.

......	......	......	......	......	7	......	1	......	......	......	......	1
......	......	......	......	......	8	......	......	......	......	......	......	......
......	......	......	......	1	11	......	......	......	......	......	......	......
......	......	......	......	......	5	1	......	......	......	......	......	1
......	......	......	......	......	12	......	......	......	......	......	......	......

TABLE 4.—***FATALITIES:*** *By kinds of mines, causes*

IRON MINES.

State.	Surface.									
	Mine cars, mine locomotives, or aerial trams. 22	Railway cars and locomotives. 23	Run or fall of ore in or from ore bins. 24	Falls of persons. 25	Stepping on nail. 26	Hand tools, axes, bars, etc. 27	Electricity. 28	Machinery. 29	Other causes. 30	**Total, surface.**
Alabama									1	**1**
Michigan			1						2	**3**
Minnesota		2								**2**
Missouri										
New Jersey										
New York										
Pennsylvania										
Tennessee										
Virginia	1									**1**
Wisconsin										
Other States										
Total, 1915	**1**	**2**	**1**						**3**	**7**
Total, 1914	1	1	2	3			1	1	2	**11**
Total, 1913	4		2	3			1	1	4	**15**
Total, 1912	2		2	2			1	1	1	**9**
Total, 1911	1	2	1					2	4	**10**

LEAD AND ZINC MINES.

State.	22	23	24	25	26	27	28	29	30	Total, surface.
Arkansas										
Illinois										
Kansas									1	**1**
Missouri									2	**2**
Oklahoma										
Wisconsin				1						**1**
Other States										
Total, 1915				**1**					**3**	**4**
Total, 1914								1	1	**2**
Total, 1913	2	1					1	2		**6**
Total, 1912								1	4	**5**
Total, 1911		3							7	**10**

NONMETALLIC MINERAL MINES.

State.	22	23	24	25	26	27	28	29	30	Total, surface.
All States, 1915		**1**	**1**							**2**
All States, 1914		2	1				2			**5**
All States, 1913									1	**1**
All States, 1912								1	1	**2**
All States, 1911										

[a] Included in other States.

and States, during the year ended Dec. 31, 1915—Continued.

IRON MINES.

Open pit.												Grand total.				
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	Total, open pit.					
31	32	33	34	35	36	37	38	39	40	41		1915	1914	1913	1912	1911
1	.....	2	.....	.....	1	.....	.....	.....	.....	.....	4	12	25	22	32	10
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	38	58	47	52	69
1	1	9	1	1	.....	.....	.....	.....	.....	1	14	36	43	63	50	76
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	3	5	7	20
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7	7	12	14	6
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	4	1	1	2
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	3	2	5
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2	9	9	2
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	5	3	3	5
2	1	11	1	1	1	.....	.....	.....	.....	1	18	103	.....	.....	.....	.....
7	2	5	1	1	.....	.....	1	.....	.....	.....	17	.....	148	.....	.....	.....
8	3	11	2	1	.....	.....	2	1	.....	.....	28	.....	.....	165	.....	.....
5	5	11	.....	1	2	.....	2	.....	.....	1	27	.....	.....	.....	172	.....
22	10	14	1	.....	1	.....	.....	.....	.....	3	51	.....	.....	.....	.....	197

LEAD AND ZINC MINES.

.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	a	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	1	1	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	1	4	2	2
.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	2	44	25	34	36	37
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	3	1	1	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	9	2	13	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	1	2
.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	2	60	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	40	.....	.....	.....
1	1	.....	.....	.....	.....	.....	1	.....	.....	1	4	.....	.....	42	.....	.....
.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	.....	.....	.....	54	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	43

NONMETALLIC MINERAL MINES.

2	.....	.....	.....	1	.....	.....	.....	1	.....	1	5	15	.....	.....	.....	.....
7	.....	.....	.....	1	.....	.....	3	1	.....	2	14	.....	27	.....	.....	.....
3	.....	6	.....	.....	.....	.....	2	2	.....	5	18	.....	.....	30	.....	.....
3	2	1	.....	1	.....	.....	2	.....	.....	3	12	.....	.....	.....	20	.....
3	1	5	.....	1	.....	.....	.....	1	.....	1	12	.....	.....	.....	.....	24

TABLE 5.—***ALL MINES, 1915:*** *Men employed, number killed, and number killed per 1,000 employed, and days worked, by States, during the year ended Dec. 31, 1915.*

State.	Number of active operators reporting.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Under-ground.	On the surface.	**Total.**			Under-ground.[a]	Per 1,000 employed.	On the surface.	Per 1,000 employed.	**Total.**	Per 1,000 employed.		
Alabama	18	2,833	2,123	**4,956**	1,331,512	269	7	2.47	5	2.36	**12**	2.42	7	2
Alaska	367	3,420	4,705	**8,125**	1,713,859	211	18	5.26	4	.85	**22**	2.71	8	9
Arizona	317	10,211	3,846	**14,057**	4,151,671	295	40	3.92	1	.26	**41**	2.92	16	37
Arkansas	14	162	523	**685**	163,165	238	1	6.17	....	....	**1**	1.46	1	2
California	704	6,271	4,143	**10,414**	3,163,407	304	34	5.42	15	3.62	**49**	4.71	17	24
Colorado	384	4,702	1,667	**6,369**	1,930,586	303	46	9.78	3	1.80	**49**	7.69	22	35
Connecticut	5	36	72	**108**	26,544	246	....	....	....	....	....	....	....	....
Florida	13	....	1,737	**1,737**	441,908	254	....	....	3	1.73	**3**	1.73	1	1
Georgia	18	70	225	**295**	62,758	213	1	14.29	....	....	**1**	3.39	1	6
Idaho	442	3,860	1,330	**5,190**	1,386,965	267	23	5.96	2	1.50	**25**	4.82	6	10
Illinois	5	263	121	**384**	114,881	299	3	11.41	....	....	**3**	7.81	3	4
Iowa	6	170	44	**214**	47,004	220	2	11.76	....	....	**2**	9.35	1	1
Kansas	25	295	140	**435**	74,704	172	1	3.39	1	7.14	**2**	4.60	1	1
Kentucky	6	88	86	**174**	42,175	242	....	....	....	....	....	....	....	....
Maine	3	....	105	**105**	19,835	189	....	....	....	....	....	....	....	....
Maryland	9	20	203	**223**	47,303	212	....	....	....	....	....	....	....	....
Massachusetts	4	24	62	**86**	20,350	237	....	....	....	....	....	....	....	....
Michigan	80	19,292	8,220	**27,512**	7,942,080	289	93	4.82	6	.73	**99**	3.60	69	151
Minnesota	70	7,611	6,961	**14,572**	3,979,111	273	20	2.63	16	2.30	**36**	2.47	25	48
Missouri	151	7,215	2,355	**9,570**	2,506,376	262	40	5.54	4	1.70	**44**	4.60	15	14
Montana	283	10,809	3,037	**13,846**	4,103,700	296	41	3.79	21	6.91	**62**	4.48	31	54
Nevada	401	3,347	2,366	**5,713**	1,726,012	302	14	4.18	4	1.69	**18**	3.15	6	14
New Hampshire	4	10	31	**41**	10,125	247	....	....	....	....	....	....	....	....
New Jersey	8	1,259	486	**1,745**	539,417	309	8	6.35	1	2.06	**9**	5.16	5	15
New Mexico	119	1,387	1,345	**2,732**	751,056	275	3	2.16	1	.74	**4**	1.46	3	6
New York	27	1,549	1,009	**2,558**	690,256	270	8	5.16	....	....	**8**	3.13	5	6
North Carolina	23	350	277	**627**	148,614	237	....	....	....	....	....	....	....	....
Ohio	6	219	46	**265**	66,613	251	2	9.13	....	....	**2**	7.55	1	....
Oklahoma	32	623	232	**855**	204,973	240	4	6.42	....	....	**4**	4.68	1	....
Oregon	182	579	491	**1,070**	223,416	209	....	....	2	4.07	**2**	1.87	....	....
Pennsylvania	19	62	322	**384**	95,549	249	....	....	1	3.11	**1**	2.60	1	3
South Carolina	3	3	484	**487**	116,933	240	....	....	....	....	....	....	....	....
South Dakota	59	1,450	346	**1,796**	583,497	325	6	4.14	....	....	**6**	3.34	5	5
Tennessee	25	1,302	1,519	**2,821**	708,870	251	7	5.38	1	.66	**8**	2.84	7	13
Texas	6	210	84	**294**	89,988	306	....	....	1	11.90	**1**	3.40	1	....
Utah	188	3,214	2,235	**5,449**	1,825,854	335	16	4.98	7	3.13	**23**	4.22	9	6
Vermont	6	71	27	**98**	27,492	281	1	14.08	....	....	**1**	10.20	1	2
Virginia	33	918	1,058	**1,976**	434,968	220	....	....	1	.95	**1**	.51	1	2
Washington	176	447	268	**715**	113,009	158	4	8.95	....	....	**4**	5.59	1	2

Wisconsin	33	1,703	948	**2,651**	742,653	280	**7**	**4.11**	**1**	**1.05**	**8**	3.02	**3**	**11**
Wyoming	45	158	228	**386**	88,849	230	**1**	**6.33**	**1**	**4.39**	**2**	5.18	**1**	....
Other States	3	10	388	**398**	140,977	354	....	....	....	....	**0**	....	....	....
Total, 1915	**4,322**	**96,223**	**55,895**	**152,118**	**42,599,015**	**280**	**451**	**4.69**	**102**	**1.82**	**553**	**3.64**	**275**	**484**
Total, 1914	4,805	101,618	56,497	**158,115**	42,785,840	271	466	4.59	93	1.65	**559**	3.54	252	442
Total, 1913	6,387	126,369	64,907	**191,276**	55,077,855	288	548	4.34	135	2.08	**683**	3.57	286	501
Total, 1912	5,967	110,056	59,143	**169,199**	48,498,510	287	522	4.74	139	2.35	**661**	3.91	273	520
Total, 1911	5,232	104,623	61,356	**165,979**	46,826,573	282	542	5.18	153	2.49	**695**	4.19	297	600

a Includes shaft accidents.

TABLE 6.—***COPPER MINES:*** *Men employed, number killed, and number killed per 1,000 employed, and days worked, by States, during the year ended Dec. 31, 1915.*

State.	Number of active operators reporting.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Under-ground.	On the surface.	**Total.**			Under-ground.*a*	Per 1,000 employed.	On the surface.	Per 1,000 employed.	**Total.**	Per 1,000 employed.		
Alaska	19	296	392	**688**	227,800	331	3	10.14	1	2.55	**4**	5.81	2	....
Arizona	145	8,942	3,079	**12,021**	3,594,814	299	33	3.69	1	.32	**34**	2.83	12	30
California	32	1,018	457	**1,475**	444,240	301	3	2.95	2	4.38	**5**	3.39	2	2
Idaho	47	418	73	**491**	122,832	250	....	....	....	....	**0**	....	....	....
Michigan	32	9,782	4,079	**13,861**	4,159,534	300	58	5.93	3	.74	**61**	4.40	44	91
Montana	45	8,887	2,286	**11,173**	3,318,193	297	33	3.71	18	7.87	**51**	4.56	29	48
Nevada	35	259	1,194	**1,453**	459,038	316	1	3.86	....	....	**1**	.69	1	3
New Mexico	40	657	1,012	**1,669**	516,407	309	1	1.52	1	.99	**2**	1.20	2	4
Utah	48	1,318	1,789	**3,107**	1,072,147	345	7	5.31	7	3.91	**14**	4.51	5	2
Washington	52	164	96	**260**	47,327	182	1	6.10	....	....	**1**	3.85	....	....
Other States	53	680	296	**976**	249,068	255	3	4.41	....	....	**3**	3.07	2	6
Total, 1915	**548**	**32,421**	**14,753**	**47,174**	**14,211,400**	**301**	**143**	**4.41**	**33**	**2.24**	**176**	**3.73**	**99**	**186**
Total, 1914	585	31,265	13,421	**44,686**	12,845,058	287	147	4.70	18	1.34	**165**	3.69	69	106
Total, 1913	694	39,917	16,222	**56,139**	17,369,266	327	203	5.09	33	2.03	**236**	4.20	100	180
Total, 1912	814	37,539	14,237	**51,776**	15,831,250	306	185	4.93	54	3.79	**239**	4.62	87	159
Total, 1911	396	31,557	13,136	**44,693**	13,774,325	308	199	6.31	39	2.97	**238**	5.33	91	195

a Includes shaft accidents.

TABLE 7.—*GOLD, SILVER, AND MISCELLANEOUS METAL MINES: Men employed, number killed, and number killed per 1,000 employed, and days worked, during the year ended Dec. 31, 1915.*

State.	Number of active operators reporting.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Under-ground.	On the surface.	Total.			Under-ground.[a]	Per 1,000 employed.	On the surface.	Per 1,000 employed.	Total.	Per 1,000 employed.		
Alaska	347	3,112	4,300	**7,412**	1,476,934	199	14	4.50	3	0.70	**17**	2.29	6	9
Arizona	169	1,268	755	**2,023**	555,497	275	7	5.52	......	......	**7**	3.46	4	7
California	658	5,201	3,438	**8,639**	2,621,479	303	31	5.96	13	3.78	**44**	5.09	15	22
Colorado	359	4,552	1,576	**6,128**	1,867,407	305	44	9.67	3	1.90	**47**	7.67	22	35
Georgia	8	16	77	**93**	16,527	178	1	62.50	......	......	**1**	10.75	1	6
Idaho	390	3,403	1,254	**4,657**	1,256,429	270	23	6.76	2	1.59	**25**	5.37	6	10
Montana	236	1,907	746	**2,653**	780,501	294	8	4.20	3	4.02	**11**	4.15	2	6
Nevada	360	3,071	1,136	**4,207**	1,257,148	299	13	4.23	4	3.52	**17**	4.04	5	11
New Mexico	70	695	235	**930**	208,777	224	2	2.88	......	......	**2**	2.15	1	2
North Carolina	7	140	115	**255**	49,246	193	......	......	......	......	......	......	......	......
Oregon	165	502	423	**925**	208,416	225	......	......	2	4.73	**2**	2.16	......	......
South Dakota	52	1,429	316	**1,745**	576,932	331	6	4.20	......	......	**6**	3.44	5	5
Tennessee	4	360	175	**535**	148,456	277	3	8.33	......	......	**3**	5.61	2	4
Utah	130	1,862	401	**2,263**	732,494	324	9	4.83	......	......	**9**	3.98	4	4
Virginia	11	280	271	**551**	131,752	239	......	......	......	......	......	......	......	......
Washington	122	283	167	**450**	65,522	146	3	10.60	......	......	**3**	6.67	1	2
Wyoming	24	42	39	**81**	12,970	160	......	......	......	......	......	......	......	......
Other States	8	1,040	725	**1,765**	506,195	287	4	3.85	1	1.38	**5**	2.83	3	10
Total, 1915	**3,120**	**29,163**	**16,149**	**45,312**	**12,472,682**	**275**	**168**	**5.76**	**31**	**1.92**	**199**	**4.39**	**77**	**133**
Total, 1914	3,536	35,432	13,006	**48,438**	13,241,280	273	154	4.35	25	1.92	**179**	3.70	60	87
Total, 1913	4,749	44,810	14,691	**59,501**	16,433,608	276	180	4.02	30	2.04	**210**	3.53	67	70
Total, 1912	4,137	31,322	12,822	**44,144**	12,229,761	277	147	4.69	29	2.26	**176**	3.99	71	98
Total, 1911	3,817	35,176	13,743	**48,919**	13,512,633	276	163	4.63	30	2.18	**193**	3.95	61	118

[a] Includes shaft accidents.

Table 8.—*IRON MINES:* *Men employed, number killed, and number killed per 1,000 employed, and days worked, during the year ended Dec. 31, 1915.*

State.	Number of active operators reporting.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Under-ground.	On the surface.	**Total.**			Under-ground.[a]	Per 1,000 employed.	On the surface.	Per 1,000 employed.	**Total.**	Per 1,000 employed.		
Alabama	14	2,833	2,080	**4,913**	1,322,596	269	7	2.47	5	2.40	**12**	2.44	7	2
Michigan	42	9,394	4,078	**13,472**	3,742,907	278	35	3.73	3	.74	**38**	2.82	25	60
Minnesota	70	7,611	6,961	**14,572**	3,979,111	273	20	2.63	16	2.30	**36**	2.47	25	48
Missouri	3	87	25	**112**	29,609	264	......	......	......	......	......	......	......	......
New Jersey	5	499	307	**806**	245,562	305	4	8.02	......	......	**4**	4.96	2	5
New York	7	851	564	**1,415**	410,150	290	7	8.23	......	......	**7**	4.09	5	6
Pennsylvania	6	22	271	**293**	73,484	251	......	......	......	......	......	......	......	......
Tennessee	8	350	542	**892**	172,145	193	1	2.86	......	......	**1**	1.12	1	......
Virginia	10	572	643	**1,215**	245,472	202	......	......	1	1.56	**1**	.82	1	2
Wisconsin	5	660	287	**947**	282,634	298	2	3.03	......	......	**2**	2.11	1	4
Other States	21	423	331	**754**	207,128	275	2	4.73	......	......	**2**	2.65	......	......
Total, 1915	**191**	**23,302**	**16,089**	**39,391**	**10,710,798**	**272**	**78**	**3.35**	**25**	**1.55**	**103**	**2.61**	**67**	**127**
Total, 1914	196	24,847	19,960	**44,807**	11,745,978	262	120	4.83	28	1.40	**148**	3.30	86	178
Total, 1913	206	29,384	21,749	**51,133**	15,064,429	295	122	4.15	43	1.98	**165**	3.23	81	178
Total, 1912	194	26,799	18,947	**45,746**	13,035,485	285	136	5.07	36	1.90	**172**	3.76	84	198
Total, 1911	207	25,461	20,492	**45,953**	12,749,121	277	136	5.34	61	2.98	**197**	4.29	114	237

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[a] Includes shaft accidents.

TABLE 9.—***LEAD AND ZINC MINES*** (*Mississippi Valley*): *Men employed, number killed, and number killed per 1,000 employed, and days worked, during the year ended Dec. 31, 1915.*

State.	Number of active operators reporting.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Underground.	On the surface.	**Total.**			Underground.[a]	Per 1,000 employed.	On the surface.	Per 1,000 employed.	**Total.**	Per 1,000 employed.		
Arkansas	12	162	98	**260**	50,865	234	1	6.17	....	....	**1**	3.85	1	**2**
Illinois	5	263	121	**384**	114,881	299	3	11.41	....	....	**3**	7.81	3	**4**
Kansas	23	283	114	**397**	66,444	167	1	3.53	1	8.77	**2**	5.04	1	**1**
Missouri	143	7,102	2,285	**9,387**	2,459,077	262	40	5.63	4	1.75	**44**	4.69	15	**14**
Oklahoma	27	596	190	**786**	187,840	239	4	6.71	....	....	**4**	5.09	1	....
Wisconsin	26	1,043	641	**1,684**	454,824	270	5	4.79	1	1.56	**6**	3.56	2	**7**
Other States	5	44	35	**79**	16,455	208	0	....	....	....	**0**	....	....	....
Total, 1915	**241**	**9,493**	**3,484**	**12,977**	**3,350,386**	**258**	**54**	**5.69**	**6**	**1.72**	60	**4.62**	**23**	**28**
Total, 1914	248	7,609	3,326	**10,935**	2,779,109	254	37	4.86	3	.90	**40**	3.66	23	**53**
Total, 1913	409	9,261	3,436	**12,697**	3,226,669	254	32	3.46	10	2.91	**42**	3.31	25	**46**
Total, 1912	464	10,812	3,520	**14,332**	3,782,944	265	48	4.44	6	1.70	**54**	3.77	26	**62**
Total, 1911	483	9,247	3,274	**12,521**	3,202,339	256	32	3.46	11	3.36	**43**	3.43	26	**40**

[a] Includes shaft accidents.

TABLE 10.—***NONMETALLIC MINERAL MINES:*** *Men employed, number killed, and number killed per 1,000 employed, and days worked, during the year ended Dec. 31, 1915.*

State.	Number of active operators reporting.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Under-ground.	On the surface.	**Total.**			Under-ground.[a]	Per 1,000 employed.	On the surface.	Per 1,000 employed.	**Total.**	Per 1,000 employed.		
California	14	52	248	**300**	97,688	326								
Florida	13		1,737	**1,737**	441,908	254			3	1.73	**3**	1.73	1	1
Georgia	9	54	108	**162**	40,151	248								
Iowa	4	166	44	**210**	46,504	221	2	12.05			**2**	9.52	1	1
Maine	3		105	**105**	19,835	189								
Michigan	6	116	63	**179**	39,639	221								
New York	18	613	428	**1,041**	251,046	241	1	1.63			**1**	.96		
North Carolina	14	36	136	**172**	38,018	221								
Ohio	4	197	40	**237**	62,610	264	2	10.15			**2**	8.44	1	
Pennsylvania	13	40	51	**91**	22,065	242			1	19.61	**1**	10.99	1	3
Tennessee	11	133	646	**779**	195,654	260	1	7.52	1	1.55	**2**	2.57	2	3
Utah	10	34	45	**79**	21,213	269								
Vermont	5	63	25	**88**	25,932	295	1	15.87			**1**	11.36	1	2
Virginia	11	61	139	**200**	56,994	285								
Other States	87	279	1,605	**1,884**	494,492	262	1	3.58	2	1.25	**3**	1.59	2	
Total, 1915	**222**	**1,844**	**5,420**	**7,264**	**1,853,749**	**255**	**8**	**4.34**	**7**	**1.29**	**15**	**2.06**	**9**	**10**
Total, 1914	240	2,465	6,784	**9,249**	2,177,306	235	8	3.25	19	2.80	**27**	2.92	14	18
Total, 1913	329	2,997	8,809	**11,806**	2,983,883	253	11	3.67	19	2.16	**30**	2.54	13	27
Total, 1912	358	3,584	9,617	**13,201**	3,619,070	274	6	1.67	14	1.46	**20**	1.52	5	3
Total, 1911	329	3,182	10,711	**13,893**	3,588,155	258	12	3.77	12	1.12	**24**	1.73	5	10

[a] Includes shaft accidents.

TABLE 11.—*ALL MINES: Serious injuries, by causes*

State.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Alabama	35	82	19	8	139	1	14	44	....	3
Alaska	19	6	....	2	10	6	2	8	....	1
Arizona	331	65	94	22	184	36	17	67	4	7
Arkansas	2	....	....	....	....	....	....	....	....	....
California	135	47	51	14	30	28	8	39	4	8
Colorado	60	18	13	6	21	9	3	12	1	5
Connecticut	....	....	....	....	....	....	....	....	....	....
Florida	....	....	....	....	....	....	....	....	....	....
Georgia	....	....	....	2	....	....	....	....	....	....
Idaho	56	21	38	1	15	8	1	9	2	....
Illinois	1	2	....	....	1	1	....	2	....	....
Iowa	....	....	....	1	1	....	....	1	....	....
Kansas	3	1	1	1	....	....	....	1	....	....
Kentucky	....	....	....	....	....	....	....	....	....	....
Maine	....	....	....	....	....	....	....	....	....	....
Maryland	....	....	....	....	....	....	....	....	....	....
Massachusetts	....	....	....	....	....	....	....	....	....	....
Michigan	442	372	188	21	300	41	61	122	2	9
Minnesota	150	45	141	17	115	26	14	16	....	2
Missouri	32	36	1	17	33	4	....	2	1	4
Montana	169	28	81	4	73	48	6	7	....	2
Nevada	71	8	35	7	44	22	2	18	....	2
New Hampshire	....	....	....	....	....	....	....	....	....	....
New Jersey	10	11	4	2	12	4	3	8	....	1
New Mexico	6	4	3	....	5	1	4	3	....	....
New York	11	29	3	3	14	3	....	6	....	2
North Carolina	....	2	6	....	8	....	....	1	....	....
Ohio	1	2	....	1	2	....	....	2	....	....
Oklahoma	10	1	3	....	....	....	....	....	....	3
Oregon	2	1	1	....	1	4	....	....	....	1
Pennsylvania	1	....	....	....	....	....	....	....	....	....
South Carolina	....	....	....	....	....	....	....	....	....	....
South Dakota	31	10	6	5	16	4	5	4	....	....
Tennessee	14	24	....	6	13	3	....	12	....	....
Texas	....	....	....	....	4	....	....	....	....	....
Utah	46	4	3	3	27	8	2	10	1	1
Vermont	....	3	....	....	1	....	....	....	....	....
Virginia	3	1	....	....	....	2	1	....	....	....
Washington	2	1	....	....	2	....	....	3	....	....
Wisconsin	28	21	4	....	37	10	5	11	1	1
Wyoming	....	....	....	....	....	....	....	....	....	....
Other States	....	....	....	....	....	....	....	....	....	....
Total, 1915	**1,671**	**845**	**695**	**143**	**1,108**	**269**	**148**	**408**	**16**	**52**

Original from PRINCETON UNIVERSITY

and States, during the year ended Dec. 31, 1915.

Underground—Continued.						Shaft.						
Mine fires.	Suffocation from natural gases.	Inrush of water.	Stepping on nail.	Other causes.	**Total, underground.**	Falling down shafts.	Objects falling down shafts.	Breaking of cables.	Overwinding.	Skip or cage.	Other causes.	**Total, shaft.**
11	**12**	**13**	**14**	**15**		**16**	**17**	**18**	**19**	**20**	**21**	
				27	**372**		5			9		**14**
6				4	**64**		1			2		**3**
	2		6	180	**1, 015**	3	5			8	19	**35**
					2							
8	5	1	6	58	**442**	4	1		1	14	3	**23**
				38	**186**	2				1		**3**
					2							
			7	28	**186**		1			1	3	**5**
			1	1	**9**				1			**1**
					3							
				3	**10**							
3	3		9	151	**1, 724**	11	19			22	17	**69**
	2		2	52	**582**	1	4			1	5	**11**
3	2	3	5	35	**178**	2	6			8	2	**18**
			3	34	**455**	2	4			7	1	**14**
1	1		9	25	**245**		1	1		4	4	**10**
			1	6	**62**	4	5			7	1	**17**
					26	1	1			5		**7**
			1	7	**79**					1	3	**4**
					17							
			1	1	**10**							
			1	5	**23**		2					**2**
					10							
					1							
				18	**99**		2			1	1	**4**
					72					1		**1**
					4							
			1	6	**112**	1	1			7		**9**
				1	**5**							
				1	**8**					1	1	**2**
					8						1	**1**
			1	18	**137**		3			2	2	**7**
21	**15**	**4**	**54**	**699**	**6, 148**	**31**	**61**	**1**	**2**	**102**	**63**	**260**

TABLE 11.—***ALL MINES:*** *Serious injuries, by causes*

State.	Surface (shops and yards).									
	Mine cars, mine locomotives, or aerial trams.	Railway cars and locomotives.	Run or fall of ore in or from ore bins.	Falls of persons.	Stepping on nail.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Other causes.	**Total, surface.**
	22	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	
Alabama	2	1	1	7		4		1	9	**25**
Alaska	8	1		3		1		1	8	**22**
Arizona	11	5	3	15	8	24	1	20	87	**174**
Arkansas										
California	9	3	2	14	5	11	3	15	30	**92**
Colorado	6	1		6		2	1	9	11	**36**
Connecticut										
Florida				1	1				1	**3**
Georgia								1		**1**
Idaho	2		1	5		1	2	3	7	**21**
Illinois										
Iowa										
Kansas					2				1	**3**
Kentucky										
Maine										
Maryland										
Massachusetts										
Michigan	11	8	7	28	3	46		36	108	**247**
Minnesota	5	2	1	9	1	9	1	10	33	**71**
Missouri	2	4	2	2		2	3	6	8	**29**
Montana	1			4		3		4	24	**36**
Nevada	2	1		7	3			6	13	**32**
New Hampshire										
New Jersey				5		3		1	4	**13**
New Mexico	1			2		3		3	5	**14**
New York			1	3	3	1		2	4	**14**
North Carolina									1	**1**
Ohio										
Oklahoma								2	2	**4**
Oregon										
Pennsylvania						1			1	**2**
South Carolina								2		**2**
South Dakota	2	1	2	8		1		1	1	**16**
Tennessee		1		1		1		4	7	**14**
Texas										
Utah	3	2		3		1		3	2	**14**
Vermont										
Virginia	1	1						3		**5**
Washington					2	1			2	**5**
Wisconsin	5			2	1	3		3	8	**22**
Wyoming			1	2					1	**4**
Other States				1	2	2			2	**7**
Total, 1915	**71**	**31**	**21**	**128**	**31**	**120**	**11**	**136**	**380**	**929**

and States, during the year ended Dec. 31, 1915—Continued.

Open pit.												
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	**Total, open pit.**	**Grand total.**
31	32	33	34	35	36	37	38	39	40	41		1915
......	1	5	......	......	......	......	3	......	......	5	14	425
5	......	......	......	1	......	......	......	......	1	1	8	97
2	......	4	......	3	......	......	......	......	......	4	13	1,237
1	......	......	......	......	......	......	5	......	1	......	7	9
5	1	......	......	9	......	1	17	......	17	23	73	630
......	......	......	......	......	......	......	......	......	......	......	......	225
......	2	......	......	......	......	......	......	......	......	......	2	2
......	......	......	......	2	......	......	3	......	......	4	9	12
......	......	......	......	......	......	......	......	......	......	......	......	3
1	......	......	......	1	......	......	......	......	......	1	3	215
......	......	......	......	......	......	......	......	......	......	......	......	10
......	......	......	......	......	......	......	......	......	......	......	......	3
......	......	......	......	......	......	......	......	......	......	......	......	13
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	1	......	......	......	......	......	......	......	1	2	2
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	1	......	......	......	1	1
3	......	2	......	......	......	......	......	......	3	......	8	2,048
43	6	27	13	17	1	3	1	......	22	49	182	846
......	......	2	......	......	......	......	......	......	......	......	2	227
......	......	......	......	1	......	......	3	......	......	......	4	509
7	1	4	......	......	......	......	1	......	1	2	16	303
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	1	1	93
2	......	13	2	3	......	......	2	......	2	18	42	89
......	......	......	......	1	......	......	......	......	......	4	5	102
1	......	......	......	......	......	......	......	......	1	1	3	21
......	......	......	......	......	......	......	......	......	......	......	......	10
......	......	......	......	......	......	......	......	......	......	......	......	29
......	......	......	......	......	......	......	......	......	......	......	......	10
1	......	1	......	......	......	......	......	......	......	......	2	5
......	......	......	......	......	......	......	......	......	......	......	......	2
......	......	......	......	......	......	......	......	......	......	......	......	119
......	......	5	1	......	......	......	5	......	......	1	12	99
......	......	......	......	......	......	......	......	......	......	......	......	4
63	1	......	2	4	1	......	2	......	3	26	102	237
......	......	......	......	......	......	......	......	......	......	......	......	5
1	......	......	......	......	......	......	......	......	2	......	3	18
......	......	......	......	......	......	......	......	......	......	......	......	14
......	......	......	......	......	......	......	......	......	......	......	......	166
......	......	......	......	......	......	......	......	......	......	......	......	4
......	......	......	......	......	......	......	......	......	......	......	......	7
135	12	64	18	42	2	4	43	......	53	141	514	7,851

TABLE 12.—*ALL MINES: Slight injuries, by causes*

State.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Alabama	120	207	89	6	289	10	27	81	....	7
Alaska	71	34	53	4	30	9	6	43	2	3
Arizona	1,087	207	357	29	377	83	40	196	10	10
Arkansas	5	1	....	....	3	....	....	....	....	....
California	446	230	190	16	127	53	36	179	9	20
Colorado	171	99	75	3	116	34	33	84	2	8
Connecticut	....	....	....	....	....	....	....	....	....	....
Florida	....	....	....	....	....	....	....	....	....	....
Georgia	4	2	1	2	....	1	....	1	....	....
Idaho	152	74	153	4	49	24	24	86	....	1
Illinois	5	7	....	....	12	....	....	1	....	....
Iowa	1	28	5	3	4	....	....	....		1
Kansas	9	7	....	1	....	1	....	4	....	....
Kentucky	2	....	....	....	....	....	....	....	....	....
Maine	....	....	....	....	....	....	....	....	....	....
Maryland	....	....	....	....	....	....	....	....	....	....
Massachusetts	....	....	....	....	....	....	....	....	....	....
Michigan	1,120	1,068	500	42	565	76	199	456	12	284
Minnesota	431	116	281	16	129	19	42	41	2	14
Missouri	179	515	60	24	185	24	25	131	5	30
Montana	522	417	493	5	313	124	12	160	5	2
Nevada	176	46	60	9	52	30	13	59	....	2
New Hampshire	....	....	....	....	....	....	....	....	....	....
New Jersey	34	50	29	6	25	7	5	25	4	1
New Mexico	35	23	14	8	6	2	2	14	....	....
New York	33	150	7	2	39	2	1	48	....	1
North Carolina	4	22	15	....	36	1	....	13	....	....
Ohio	4	4	....	2	1	....	....	1	....	....
Oklahoma	23	8	9	....	2	4	....	3	....	4
Oregon	4	2	1	....	1	7	....	3	....	....
Pennsylvania	....	....	....	....	....	....	....	....	....	....
South Carolina	....	....	....	....	....	....	....	....	....	....
South Dakota	54	73	34	3	56	12	31	38	....	....
Tennessee	47	166	4	7	54	21	2	28	....	4
Texas	2	....	4	....	2	1	1	3	....	....
Utah	142	16	51	3	74	27	31	27	2	3
Vermont	1	....	....	....	1	1	....	....	....	....
Virginia	11	4	2	2	6	2	....	1	....	....
Washington	....	2	....	1	1	1	....	....	....	....
Wisconsin	57	53	28	1	69	2	4	23	....	2
Wyoming	....	....	....	....	....	....	....	....	....	....
Other States	....	....	....	....	....	....	....	....	....	....
Total, 1915	**4,952**	**3,631**	**2,515**	**199**	**2,624**	**578**	**534**	**1,749**	**53**	**397**

and States, during the year ended Dec. 31, 1915.

Underground—Continued.						Shaft.						
Mine fires.	Suffocation from natural gases.	Inrush of water.	Stepping on nail.	Other causes.	**Total, underground.**	Falling down shafts.	Objects falling down shafts.	Breaking of cables.	Overwinding.	Skip or cage.	Other causes.	**Total, shaft.**
11	12	13	14	15		16	17	18	19	20	21	
......	......	......	4	94	**934**	1	7	......	......	8	3	**19**
1	3	......	......	38	**297**	2	......	......	......	2	1	**5**
2	9	......	65	813	**3,285**	3	11	1	......	6	20	**41**
......	......	......	2	8	**19**	......	......	......	......	......	......	......
5	21	12	123	256	**1,723**	3	12	......	......	13	16	**44**
......	1	......	14	197	**837**	1	7	......	......	3	......	**11**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	4	......	**15**	......	......	......	......	1	......	**1**
......	5	......	22	97	**691**	......	8	......	......	4	8	**20**
......	4	......	......	......	**29**	......	......	......	......	2	......	**2**
......	......	......	......	15	**57**	......	......	......	......	......	......	......
......	......	......	1	11	**34**	......	......	......	......	......	......	......
......	......	......	......	2	**4**	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
1	9	......	109	640	**5,081**	13	70	1	......	39	71	**194**
......	2	......	42	251	**1,386**	......	7	......	......	8	10	**25**
12	7	18	91	291	**1,597**	1	40	1	......	13	16	**71**
......	......	......	36	566	**2,655**	1	28	......	......	9	10	**48**
......	......	......	17	81	**545**	......	3	......	......	4	5	**12**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	5	20	**211**	2	2	......	......	5	1	**10**
......	......	......	42	3	**149**	2	4	......	......	17	2	**25**
......	......	......	5	39	**327**	......	......	......	......	2	......	**2**
......	......	......	......	6	**97**	......	......	......	......	1	......	**1**
......	4	......	......	1	**17**	......	......	......	......	......	......	......
......	......	......	7	13	**73**	......	2	......	......	4	3	**9**
......	......	......	2	4	**24**	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	3	112	**416**	......	......	......	......	3	2	**5**
......	1	......	4	14	**352**	......	2	1	......	3	1	**7**
......	......	......	......	22	**35**	......	......	......	......	1	1	**2**
......	1	......	13	34	**424**	......	......	......	......	4	......	**4**
......	......	......	......	......	**3**	......	......	......	......	......	......	......
......	......	......	10	58	**96**	1	3	......	......	......	......	**4**
......	......	......	2	1	**8**	......	......	......	......	......	......	......
......	......	......	9	76	**324**	......	4	......	......	5	5	**14**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
21	**67**	**30**	**632**	**3,763**	**21,745**	**30**	**210**	**4**	......	**157**	**175**	**576**

TABLE 12.—***ALL MINES:*** *Slight injuries, by causes*

State.	Surface (shops and yards.)									
	Mine cars, mine locomotives, or aerial trams.	Railway cars and locomotives.	Run or fall of ore in or from ore bins.	Falls of persons.	Stepping on nail.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Other causes.	**Total, surface.**
	22	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	
Alabama	3	1	2	11	3	11		11	30	**72**
Alaska	15		4	22	6	25	4	9	13	**98**
Arizona	24	5	4	29	31	54	4	34	242	**427**
Arkansas										
California	15	6	3	24	24	40	6	17	78	**213**
Colorado	9		4	12	13	24	15	15	52	**144**
Connecticut										
Florida	1			11	11	13		11	43	**90**
Georgia					1	1		1		**3**
Idaho		1		5	2	3		5	20	**36**
Illinois					2	2	1	1	4	**10**
Iowa				1	1			1	4	**7**
Kansas					1	5				**6**
Kentucky				1						**1**
Maine										
Maryland										
Massachusetts										
Michigan	12	13	24	62	30	89	2	52	187	**471**
Minnesota	10	9	1	28	15	65	1	19	134	**282**
Missouri	12	5	7	13	23	17		7	56	**140**
Montana	5		2	2	2	7		21	235	**274**
Nevada	5	3	3	10	2	6		6	27	**62**
New Hampshire										
New Jersey	1	1	1	6	1	2	1	4	9	**26**
New Mexico	3			4	1	4		2	2	**16**
New York		3	7	5	6	3		2	19	**45**
North Carolina	3					5		2	3	**13**
Ohio							1	1		**2**
Oklahoma			1	1	2	2		2	6	**14**
Oregon				1	1			1	3	**6**
Pennsylvania			1			1				**2**
South Carolina		1				2				**3**
South Dakota	4			5	1	10		6	15	**41**
Tennessee	6	3		7	14	21	1	8	53	**113**
Texas	5				2					**7**
Utah	7	5	1	5	7	10		8	48	**91**
Vermont						1				**1**
Virginia				2	2	3		1	16	**24**
Washington	1				1			1	1	**4**
Wisconsin	2		15	7	15	13	2	8	38	**100**
Wyoming	1					2				**3**
Other States	3		1	10	15	15		2	51	**97**
Total, 1915	**147**	**56**	**81**	**284**	**235**	**456**	**38**	**258**	**1,389**	**2,944**

and States, during the year ended Dec. 31, 1915—Continued.

Open pit.												
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	**Total, open pit.**	**Grand total.**
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**		**1915**
3	......	7	1	2	1	......	1	......	5	31	**51**	**1,076**
10	......	......	......	1	......	......	1	......	......	3	**15**	**415**
6	......	5	......	2	......	......	......	......	2	9	**24**	**3,777**
......	......	......	......	......	......	......	1	......	......	......	**1**	**20**
13	4	......	......	41	......	......	58	4	48	150	**318**	**2,298**
1	......	......	......	......	......	......	1	......	......	......	**2**	**994**
......	......	......	......	......	......	......	......	......	......	......	......	......
3	1	6	......	3	1	......	14	3	4	39	**74**	**164**
......	......	1	2	......	......	......	......	......	1	1	**5**	**24**
......	......	......	......	2	......	......	2	1	1	3	**9**	**756**
......	......	......	......	......	......	......	......	......	......	......	......	**41**
......	......	......	......	......	......	......	......	......	......	......	......	**64**
......	......	......	......	......	......	......	......	......	......	......	......	**40**
......	......	1	......	......	......	......	......	......	1	2	**4**	**9**
......	......	......	......	......	......	......	......	......	1	......	**1**	**1**
......	......	......	......	......	......	......	......	......	......	4	**4**	**4**
5	......	......	......	......	......	5	......	......	......	......	**10**	**10**
7	1	......	1	4	......	......	......	......	12	2	**27**	**5,773**
70	5	52	22	45	1	3	2	......	70	180	**450**	**2,143**
3	......	......	......	......	......	......	......	......	......	......	**3**	**1,811**
......	......	......	......	......	......	......	......	......	......	......	......	**2,977**
27	1	19	11	7	......	......	16	......	5	6	**92**	**711**
......	......	......	......	......	......	......	......	......	......	......	......	......
1	......	......	......	......	......	......	......	......	......	......	**1**	**248**
18	5	25	7	12	......	......	7	......	15	68	**157**	**347**
......	......	......	......	......	......	......	......	......	......	1	**1**	**375**
2	......	......	......	......	......	......	......	......	1	......	**3**	**114**
......	......	......	......	......	......	......	......	......	......	......	......	**19**
......	......	......	......	......	......	......	1	......	......	1	**2**	**98**
2	......	......	......	1	......	......	1	......	......	1	**5**	**35**
......	......	......	......	......	......	......	1	......	......	......	**1**	**3**
......	......	......	......	......	......	......	......	......	......	1	**1**	**4**
......	......	......	......	......	......	......	......	......	......	......	......	**462**
5	......	5	3	1	3	1	10	......	6	9	**43**	**515**
......	......	......	......	......	......	......	......	......	......	......	......	**44**
223	16	43	30	92	2	2	7	2	49	382	**848**	**1,367**
......	......	......	......	......	......	......	......	......	......	......	......	**4**
1	1	1	......	......	......	......	1	......	2	19	**25**	**149**
......	......	......	......	......	......	......	......	......	......	......	......	**12**
1	......	......	......	......	......	......	......	......	......	......	**1**	**439**
......	......	......	......	......	......	......	......	......	......	1	**1**	**4**
......	......	......	......	......	......	......	......	......	......	......	......	**97**
401	**34**	**165**	**77**	**213**	**8**	**11**	**124**	**10**	**223**	**913**	**2,179**	**27,444**

TABLE 13.—***ALL MINES:*** *Men employed, number injured, and number*

State.	Employees.[a]	Number seriously injured.					
		Underground.	Per 1,000 employed.	On the surface.	Per 1,000 employed.	**Total.**	Per 1,000 employed.
Alabama	4,956	386	136.25	39	18.37	**425**	85.75
Alaska	8,125	67	19.59	30	6.38	**97**	11.94
Arizona	14,057	1,050	102.83	187	48.62	**1,237**	88.00
Arkansas	685	2	12.35	7	13.38	**9**	13.14
California	10,414	465	74.15	165	39.83	**630**	60.50
Colorado	6,369	189	40.20	36	21.60	**225**	35.33
Connecticut	108	....	....	2	27.78	**2**	18.52
Florida	1,737	....	....	12	6.91	**12**	6.91
Georgia	295	2	28.57	1	4.44	**3**	10.17
Idaho	5,190	191	49.48	24	18.05	**215**	41.43
Illinois	384	10	38.02	....	....	**10**	26.04
Iowa	214	3	17.65	....	....	**3**	14.02
Kansas	435	10	33.90	3	21.43	**13**	29.89
Kentucky	174	....	....	....	....	....	....
Maine	105	....	....	2	19.05	**2**	19.05
Maryland	223	....	....	....	....	....	....
Massachusetts	86	....	....	1	16.13	**1**	11.63
Michigan	27,512	1,793	92.94	255	31.02	**2,048**	74.44
Minnesota	14,572	593	77.91	253	36.35	**846**	58.06
Missouri	9,570	196	27.17	31	13.16	**227**	23.72
Montana	13,846	469	43.39	40	13.17	**509**	36.76
Nevada	5,713	255	76.19	48	20.29	**303**	53.04
New Hampshire	41	....	....	....	....	....	....
New Jersey	1,745	79	62.75	14	28.81	**93**	53.30
New Mexico	2,732	33	23.79	56	41.64	**89**	32.58
New York	2,558	83	53.58	19	18.83	**102**	39.87
North Carolina	627	17	48.57	4	14.44	**21**	33.49
Ohio	265	10	45.66	....	....	**10**	37.74
Oklahoma	855	25	40.13	4	17.24	**29**	33.92
Oregon	1,070	10	17.27	....	....	**10**	9.35
Pennsylvania	384	1	16.13	4	12.42	**5**	13.02
South Carolina	487	....	....	2	4.13	**2**	4.11
South Dakota	1,796	103	71.03	16	46.24	**119**	66.26
Tennessee	2,821	73	56.07	26	17.12	**99**	35.09
Texas	294	4	19.05	....	....	**4**	13.61
Utah	5,449	121	37.65	116	51.90	**237**	43.49
Vermont	98	5	70.42	....	....	**5**	51.02
Virginia	1,976	10	10.89	8	7.56	**18**	9.11
Washington	715	9	20.13	5	18.66	**14**	19.58
Wisconsin	2,651	144	84.56	22	23.21	**166**	62.62
Wyoming	386	....	....	4	17.54	**4**	10.36
Other States	398	....	....	7	18.04	**7**	17.59
Total, 1915	**152,118**	**6,408**	**66.60**	**1,443**	**25.82**	**7,851**	**51.61**

[a] **For segregation of surface and underground employees, see Table 5, page 34.**

injured per 1,000 employed, and days worked, by States, during the year 1915.

Number slightly injured.						Character of accidents that must be reported according to State law.
Underground.	Per 1,000 employed.	On the surface.	Per 1,000 employed.	Total.	Per 1,000 employed.	
953	336.39	123	57.94	**1,076**	217.11	
302	88.30	113	24.02	**415**	51.08	Fatal or serious, at mines employing 6 or more men. Acts Apr. 30, 1913; Apr. 25, 1915.
3,326	325.73	451	117.26	**3,777**	268.69	Fatal or serious. Acts of 1912, chap. 33.
19	117.28	1	1.91	**20**	29.20	
1,767	281.77	531	128.17	**2,298**	220.66	Any accident. Acts Apr. 8, 1911; May 26 and Aug. 10, 1913.
848	180.35	146	87.58	**994**	156.07	All fatal or otherwise, by all employers of 4 or more persons. Act Apr. 10, 1915.
....	....	....	....	....	....	Fatal or one day. Act May 29, 1913.
....	....	164	94.42	**164**	94.42	
16	228.57	8	35.56	**24**	81.36	
711	184.20	45	33.83	**756**	145.66	Fatal or serious. Rev. Code 1909, sec. 207.
31	117.87	10	82.64	**41**	106.77	Fatal or one week. Act June 28, 1913.
57	335.29	7	159.09	**64**	299.07	All fatal or otherwise. Act Apr. 18, 1913.
34	115.25	6	42.86	**40**	91.95	All accidents at mines employing 5 or more men. Act Mar. 14, 1911.
4	45.45	5	58.14	**9**	51.72	All accidents at mines employing 6 or more men. Act Mar. 21, 1914.
....	....	1	9.52	**1**	9.52	All accidents. Act Apr. 1, 1915.
....	....	4	19.70	**4**	17.94	All accidents. Act Apr. 16, 1914.
....	....	10	161.29	**10**	116.28	All accidents. Acts June 28, 1911; June 25, 1914.
5,275	273.43	498	60.58	**5,773**	209.84	All fatal or otherwise. Act Apr. 25, 1911.
1,411	185.39	732	105.16	**2,143**	147.06	Fatal or serious. Gen. Stats., 1913, par. 3924.
1,668	231.19	143	60.72	**1,811**	189.24	Fatal or serious. Rev. Stats., 1909, sec. 8462.
2,703	250.07	274	90.22	**2,977**	215.01	All accidents. Act Mar. 8, 1915.
557	166.42	154	65.09	**711**	124.45	Fatal or serious at mines employing wage earners. Laws of 1912.
....	....	....	....	....	....	All required by commissioner of labor. Act Apr. 15, 1911.
221	175.54	27	55.56	**248**	142.12	All accidents. Laws of 1911, chap. 95.
174	125.45	173	128.62	**347**	127.01	
329	212.40	46	45.59	**375**	146.60	All fatal or otherwise. Act Mar. 16, 1914.
98	280.00	16	57.76	**114**	181.82	
17	77.63	2	43.48	**19**	71.70	All accidents at mines employing 5 or more men. Acts June 15, 1911; Mar. 14, 1913.
82	131.62	16	68.97	**98**	114.62	All accidents at mines employing 2 or more men. Act Mar. 22, 1915.
24	41.45	11	22.40	**35**	32.71	Fatal and all injuries causing employee to cease work, by employers of 4 or more persons. Acts Feb. 18, 1911; Feb. 25, 1913.
....	....	3	9.32	**3**	7.81	All accidents. Act June 2, 1915, effective Jan. 1, 1916.
....	....	4	8.26	**4**	8.21	
421	290.34	41	118.50	**462**	257.24	Fatal or serious at all mines not worked exclusively by owner or lessee. Acts Mar. 1, 1890; Mar. 4, 1915.
359	275.73	156	102.70	**515**	182.56	
37	176.19	7	83.33	**44**	149.66	All accidents at mines employing 6 or more men. Act Apr. 16, 1913.
428	133.17	939	420.13	**1,367**	250.87	
3	42.25	1	37.04	**4**	40.82	Fatal or one day, at mines employing 11 or more men. Act Apr. 1, 1915.
100	108.93	49	46.31	**149**	75.40	
8	17.90	4	14.93	**12**	16.78	"Any accident." Acts Mar. 14, 1911; Mar. 22, 1915.
338	198.47	101	106.54	**439**	165.60	All "causing death or disability" by employers of 4 or more persons. Acts May 3, 1911; June 26, 1913.
....	....	4	17.54	**4**	10.36	All accidents at mines employing 5 or more men. Act Feb. 27, 1915.
....	....	97	250.00	**97**	243.72	
22,321	**231.97**	**5,123**	**91.65**	**27,444**	**180.41**	

TABLE 14.—***ACTIVE OPERATORS:*** *Number reporting less than 1,000 days, and number reporting 1,000 or more days' work performed during the year ended Dec. 31, 1915.*

State.	Less than 1,000 days' work done.						1,000 or more days' work done.						Grand total.			
	Copper.	Iron.	Lead and zinc.	Gold, silver, and miscellaneous metal.	Nonmetal.	Total.	Copper.	Iron.	Lead and zinc.	Gold, silver, and miscellaneous metal.	Nonmetal.	Total.	1915	1914	1913	1912
Alabama					1	1		14			3	17	18	21	24	20
Alaska	6			101		107	13			246	1	260	367	350	350	[a]30
Arizona	78			93	2	173	67			76	1	144	317	346	426	479
Arkansas			2			2			10	1	1	12	14	6	8	11
California	19			480	8	507	13			178	6	197	704	854	1,054	1,048
Colorado	10			189	4	203	4	4		170	3	181	384	412	1,013	624
Connecticut					1	1		1			3	4	5	6	5	5
Florida											13	13	13	18	27	24
Georgia				2	1	3		1		6	8	15	18	18	21	29
Idaho	34			302	1	337	13	1		88	3	105	442	526	588	639
Illinois									5			5	5	8	12	8
Iowa			2			2					4	4	6	7	9	12
Kansas			9		1	10			14		1	15	25	24	40	50
Kentucky									3		3	6	6	11	15	14
Maine											3	3	3	4	5	4
Maryland		1			3	4	1	1		1	2	5	9	12	16	19
Massachusetts								1			3	4	4	3	3	4
Michigan	1					1	31	42			6	79	80	80	84	79
Minnesota		7				7		63				63	70	57	54	43
Missouri	1	1	23		1	26		2	120		3	125	151	172	283	318
Montana	33			190	1	224	12			46	1	59	283	302	384	405
Nevada	24			248	2	274	11	1		112	3	127	401	450	566	554
New Hampshire											4	4	4	5	7	7
New Jersey								5		2	1	8	8	7	7	10
New Mexico	24	1		46	2	73	16	4		24	2	46	119	118	139	163
New York					2	2		7		2	16	25	27	34	36	39
North Carolina	1			2	8	11		1		5	6	12	23	30	60	70
Ohio								2			4	6	6	4	7	7
Oklahoma			3			3			24		5	29	32	23	36	30
Oregon	13			141	1	155	3			24		27	182	225	261	260
Pennsylvania					8	8		6			5	11	19	22	34	38
South Carolina					1	1					2	2	3	5	6	7
South Dakota	2			37	4	43				15	1	16	59	60	74	63
Tennessee				1	3	4	2	8		3	8	21	25	27	36	36
Texas										2	4	6	6	7	8	8
Utah	27			83	4	114	21			47	6	74	188	234	285	336
Vermont					1	1	1				4	5	6	5	10	11
Virginia	1			2	3	6		10		9	8	27	33	25	28	33
Washington	43	1		106	1	151	9			16		25	176	188	231	277
Wisconsin			5		1	6		5	21		1	27	33	38	61	77
Wyoming	12			21	5	38	2	1		3	1	7	45	60	71	74
Other States					1	1					2	2	3	1	3	2
Total, 1915	**329**	**11**	**44**	**2,044**	**71**	**2,499**	**219**	**180**	**197**	**1,076**	**151**	**1,823**	**4,322**			
Total, 1914	371	15	67	2,356	78	2,887	214	181	181	1,180	162	1,918		4,805		
Total, 1913	395	18	93	2,588	105	3,199	299	188	316	2,161	224	3,188			6,387	
Total, 1912	455	20	137	2,848	126	3,586	359	174	327	1,289	232	2,381				5,967

[a] Placer mines not included.

METAL-MINE FATALITY RATES COMPARED ON BASIS OF YEAR OF 300 WORKING DAYS.

As a mine can be operated only about 300 days in a year, if Sundays, holidays, and a few days for repairs be excluded, a comparison of the accident and fatality rates at metal mines in the various States has been made on that basis and is shown in Table 17. A 300-day year is used, as it corresponds closely with actual conditions at metal mines, the average number of working days per year being 281, over a five-year period. The average number of days actually worked at the mines in the various States during the year 1915 ranged from 172 in Kansas to 335 in Utah, the average for the United States being 280 days.

These tables show that a true comparison can not be made without reducing the number of days to a common denominator. In order to obtain the number of 300-day workers, it is necessary to know the total number of shifts (days) of labor performed during the year, as given in Table 5. A still better comparison could be made if data showing the actual number of hours' labor performed were available.

The first column (Table 17) under "Number of fatalities" gives the rate as obtained from the actual number of men reported as working, and the second column gives the rate when the number of employees is reduced to the equivalent of 300-day workers.

Comparison of fatality rates in 1915 in the various branches of the mineral industry in the United States, on both the actual-time basis and on the 300-day basis, is given in the accompanying table.

Fatality rates in different branches of mineral industries in 1915, compared on a 300-day basis.

[Length of shift not considered.]

Branch of mineral industry.	Actual days active.	Men employed.		Days of labor performed.	Killed.	Number killed per 1,000 employed.	
		Actual number.	Equivalent in 300-day workers (calculated).			On actual-time basis.	On 300-day basis.
Metal mines	280	152,118	141,997	42,599,015	553	3.64	3.89
Ore-dressing plants	309	18,564	19,107	5,732,184	30	1.62	1.57
Smelting plants	347	31,327	36,262	10,878,486	38	1.21	1.05
Coal mines	209	734,008	511,598	153,479,495	2,269	3.09	4.44
Coke ovens:							
Beehive	262	17,699	15,436	4,630,661	10	.57	.65
By-product	359	13,361	15,979	4,793,815	28	2.10	1.75
Quarries	246	100,740	82,447	24,734,224	148	1.47	1.80
Total	231	1,067,817	822,826	246,847,880	3.076	2.88	3.74

TABLE 15.—***ALL MINES:*** *Percentages of fatalities and injuries,*

NUMBER KILLED.

Kind of mine.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Copper	39.20	1.14	2.27	9.09	2.84	7.39	1.14	......	2.84	......
Gold, silver, and miscellaneous metal	24.62	2.01	1.01	18.59	3.52	11.56	2.51	0.50	2.01	......
Iron	40.78	2.91	.97	5.83	3.88	7.77	2.91	......	.97	......
Lead and zinc (Mississippi Valley)	45.00	1.67	......	18.33	1.67	1.67	......	......	......	......
Nonmetallic mineral	26.67	......	......	13.33	6.67	......	......	......	......	......
Total	**34.54**	**1.81**	**1.27**	**13.02**	**3.25**	**8.14**	**1.81**	**.18**	**1.81**	......

NUMBER SERIOUSLY INJURED.

Copper	24.19	12.33	7.54	1.42	14.04	3.22	2.29	5.43	0.17	0.38
Gold, silver, and miscellaneous metal	22.71	7.87	8.93	2.13	9.64	5.14	1.42	5.80	.35	1.18
Iron	17.19	9.77	12.35	1.55	17.42	2.76	1.96	4.80	.13	.53
Lead and zinc (Mississippi Valley)	17.08	16.53	1.10	4.96	15.97	2.20	......	3.31	.28	1.93
Nonmetallic mineral	4.04	7.07	2.02	5.05	11.11	1.01	1.01	3.03	......	......
Total	**21.28**	**10.76**	**8.85**	**1.82**	**14.11**	**3.43**	**1.89**	**5.20**	**.20**	**.66**

NUMBER SLIGHTLY INJURED.

Copper	21.13	12.51	8.71	0.64	8.55	2.23	1.87	6.56	0.17	2.49
Gold, silver, and miscellaneous metal	16.87	12.19	10.40	.70	8.95	3.32	2.56	7.70	.22	.46
Iron	17.14	11.50	11.55	.67	12.21	1.00	1.92	4.90	.21	.59
Lead and zinc (Mississippi Valley)	11.36	25.24	3.44	1.13	10.88	1.26	1.09	6.83	.22	1.48
Nonmetallic mineral	4.41	10.41	1.59	1.76	4.23	.53	......	.71	......	.35
Total	**18.04**	**13.23**	**9.16**	**.73**	**9.56**	**2.11**	**1.95**	**6.37**	**.19**	**1.45**

by causes and kinds of mines, during the year ended Dec. 31, 1915.

NUMBER KILLED.

Underground—Continued.						Shaft.						
Mine fires. 11	Suffocation from natural gases. 12	Inrush of water. 13	Stepping on nail. 14	Other causes. 15	**Total, underground.**	Falling down shafts. 16	Objects falling down shafts. 17	Breaking of cables. 18	Overwinding. 19	Skip or cage. 20	Other causes. 21	**Total, shaft.**
......	......	......	0.57	1.14	**67.61**	4.55	1.70	0.57	0.57	5.11	1.14	**13.64**
......	1.01	......	......	......	**67.34**	9.55	3.02	......	......	3.02	1.51	**17.09**
......	.97	......	......	.97	**67.96**	1.94	.97	.97	......	2.91	.97	**7.77**
......	......	5.00	......	......	**73.33**	8.33	3.33	......	......	3.33	1.67	**16.67**
......	......	......	......	......	**46.67**	......	6.67	......	......	......	......	**6.67**
......	**.54**	**.54**	**.18**	**.54**	**67.63**	**6.15**	**2.35**	**.36**	**.18**	**3.62**	**1.27**	**13.93**

NUMBER SERIOUSLY INJURED.

0.23	0.09	......	0.44	8.41	**80.19**	0.32	0.55	......	......	0.81	0.81	**2.49**
.53	.30	0.06	1.18	11.18	**78.42**	.77	.53	0.06	0.06	1.83	.65	**3.90**
.04	.22	......	.49	7.69	**76.90**	.22	.93	......	......	1.47	.89	**3.51**
.83	.55	.83	1.93	12.40	**79.89**	.55	3.03	......	.28	2.75	1.10	**7.71**
......	......	......	1.01	2.02	**37.37**	......	1.01	......	......	......	......	**1.01**
.27	**.19**	**.05**	**.69**	**8.91**	**78.31**	**.39**	**.78**	**.01**	**.03**	**1.30**	**.80**	**3.31**

NUMBER SLIGHTLY INJURED.

0.03	0.13	......	1.80	13.47	**80.28**	0.13	0.66	0.01	......	0.28	0.59	**1.67**
.07	.46	0.18	2.87	14.78	**81.74**	.12	.54	.01	......	.79	.52	**1.99**
......	.10	......	1.97	13.00	**76.77**	.10	.80	.02	......	.77	.76	**2.45**
.52	.48	.78	4.61	15.88	**85.20**	.04	1.96	.04	......	1.00	1.04	**4.09**
......	.71	......	.35	5.11	**30.16**	......	.35	......	......	.18	......	**.53**
.08	**.24**	**.11**	**2.30**	**13.71**	**79.23**	**.11**	**.77**	**.01**	......	**.57**	**.64**	**2.10**

TABLE 15.—***ALL MINES:*** *Percentages of fatalities and injuries, by causes*

NUMBER KILLED.

Kind of mine.	Surface.									
	Mine cars, mine locomotives, or aerial trams.	Railway cars and locomotives.	Run or fall of ore in or from ore bins.	Falls of persons.	Stepping on nail.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Other causes.	**Total, surface.**
	22	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	
Copper	0.57	1.70	......	1.14	......	......	......	0.57	9.66	**13.64**
Gold, silver, and miscellaneous metal	1.01	.50	......	......	......	......	.50	2.51	1.01	**5.53**
Iron	.97	1.94	.97	......	......	......	......	......	2.91	**6.80**
Lead and zinc (Mississippi Valley)	......	......	......	1.67	......	......	......	......	5.00	6.67
Nonmetallic mineral	......	6.67	6.67	......	......	......	......	......	......	13.33
Total	**.72**	**1.27**	**.36**	**.54**	......	......	**.18**	**1.09**	**4.52**	**8.68**

NUMBER SERIOUSLY INJURED.

Kind of mine.	22	23	24	25	26	27	28	29	30	Total, surface.
Copper	0.64	0.35	0.20	1.54	0.26	1.89	0.03	1.54	5.77	**12.21**
Gold, silver, and miscellaneous metal	1.48	.35	.47	2.07	.59	.83	.35	2.19	4.02	**12.36**
Iron	1.02	.31	.18	1.55	.27	1.55	.04	1.42	3.96	**10.31**
Lead and zinc (Mississippi Valley)	.28	1.10	.55	.83	.83	.83	.83	2.75	3.86	**11.85**
Nonmetallic mineral	......	2.02	......	2.02	3.03	3.03	......	4.04	10.10	**24.24**
Total	**.91**	**.39**	**.27**	**1.63**	**.39**	**1.53**	**.14**	**1.73**	**4.84**	**11.83**

NUMBER SLIGHTLY INJURED.

Kind of mine.	22	23	24	25	26	27	28	29	30	Total, surface.
Copper	0.34	0.14	0.23	0.69	0.49	1.06	0.03	0.69	5.00	**8.66**
Gold, silver, and miscellaneous metal	.84	.14	.19	1.18	.85	1.76	.40	1.18	4.10	**10.65**
Iron	.51	.33	.21	1.28	.74	2.30	.07	1.00	5.32	**11.76**
Lead and zinc (Mississippi Valley)	.57	.22	.96	.91	1.70	1.39	.09	.74	3.96	**10.53**
Nonmetallic mineral	1.23	.88	1.06	4.41	6.35	7.23	.18	3.53	19.40	**44.27**
Total	**.53**	**.20**	**.30**	**1.04**	**.86**	**1.66**	**.14**	**.94**	**5.06**	**10.73**

and kinds of mines, during the year ended Dec. 31, 1915—Continued.

NUMBER KILLED.

Open pit.												
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	**Total, open pit.**	**Grand total.**
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**		
1.14	......	3.41	......	0.57	......	......	......	......	......	......	**5.11**	**100.00**
3.02	2.51	.50	......	1.51	......	......	1.01	1.01	......	.50	**10.05**	**100.00**
1.94	.97	10.68	0.97	.97	0.97	......	......	......	......	.97	**17.48**	**100.00**
......	......	1.67	......	......	......	......	......	......	......	1.67	**3.33**	**100.00**
13.33	......	......	......	6.67	......	......	......	6.67	......	6.67	**33.33**	**100.00**
2.17	**1.09**	**3.43**	**.18**	**1.09**	**.18**	......	**.36**	**.54**	......	**.72**	**9.76**	**100.00**

NUMBER SERIOUSLY INJURED.

2.23	0.03	0.61	0.12	0.32	0.03	......	0.15	......	0.17	1.45	**5.11**	**100.00**
.47	.12	......	......	.65	......	.06	1.48	......	1.01	1.54	**5.32**	**100.00**
2.13	.31	1.55	.62	.76	.04	.13	.18	......	1.16	2.40	**9.28**	**100.00**
......	......	.55	......	......	......	......	......	......	......	......	**.55**	**100.00**
2.02	2.02	6.06	......	3.03	......	......	9.09	......	4.04	11.11	**37.37**	**100.00**
1.72	**.15**	**.81**	**.23**	**.53**	**.03**	**.05**	**.55**	......	**.68**	**1.80**	**6.55**	**100.00**

NUMBER SLIGHTLY INJURED.

2.25	0.19	0.78	0.41	0.96	0.02	0.02	0.25	0.02	0.59	3.90	**9.38**	**100.00**
.55	.07	.03	......	.66	.04	......	.99	.07	.78	2.42	**5.62**	**100.00**
1.28	.10	.97	.46	.82	.03	.05	.07	......	1.43	3.81	**9.02**	**100.00**
.17	......	......	......	......	......	......	......	......	......	......	**.17**	**100.00**
2.82	.18	2.12	.18	1.06	.18	1.06	4.23	.53	2.47	10.23	**25.05**	**100.00**
1.46	**.12**	**.60**	**.28**	**.78**	**.03**	**.04**	**.45**	**.04**	**.81**	**3.33**	**7.94**	**100.00**

TABLE 16.—***ALL MINES, 1914:*** *Men employed, number killed, and number killed per 1,000 employed, and days worked, by States, during the year ended Dec. 31, 1914.*

State.	Number of active operators.	Number of employees.			Days' work done.	Average number of days worked.	Number killed.						Widows.	Orphans.
		Under-ground.	On the surface.	Total.			Under-ground.[a]	Per 1,000 employed.	On the surface.	Per 1,000 employed.	**Total.**	Per 1,000 employed.		
Alabama	21	3,018	2,207	5,225	1,431,218	274	23	7.62	2	0.91	**25**	4.78	15	29
Alaska	350	6,225	1,775	8,000	2,052,450	257	15	2.41	4	2.25	**19**	2.38	2	5
Arizona	346	10,700	3,311	14,011	4,361,024	311	62	5.79	1	.30	**63**	4.50	**24**	36
Arkansas and Louisiana	7	15	457	472	111,502	236	....	....	1	2.19	**1**	2.12	1	....
California	854	5,787	3,974	9,761	2,727,281	279	31	5.36	10	2.52	**41**	4.20	11	16
Colorado	412	7,493	1,735	9,228	2,768,400	300	43	5.74	4	2.31	**47**	5.09	18	15
Connecticut	6	125	91	216	38,975	180	....	....	....	....	....	....	....	....
Florida	18	....	2,885	2,885	679,182	235	....	....	10	3.47	**10**	3.47	4	1
Georgia	18	66	239	305	48,386	159	....	....	1	4.18	**1**	3.28	....	....
Idaho	526	3,979	1,270	5,249	1,366,877	260	23	5.78	2	1.57	**25**	4.76	11	11
Illinois	8	292	198	490	104,462	213	....	....	....	....	....	....	....	....
Iowa	7	254	27	281	62,883	224	....	....	....	....	....	....	....	....
Kansas	24	210	105	315	67,386	214	1	4.76	....	....	**1**	3.17	1	1
Kentucky	11	57	164	221	30,487	138	2	35.09	....	....	**2**	9.05	2	3
Maine	4	....	128	128	30,389	237	....	....	....	....	....	....	....	....
Maryland	12	16	53	69	13,850	201	....	....	....	....	....	....	....	....
Massachusetts	3	22	9	31	8,463	273	....	....	....	....	....	....	....	....
Michigan	80	19,013	8,259	27,272	7,472,852	274	93	4.89	6	.73	**99**	3.63	56	106
Minnesota	57	7,886	9,808	17,694	4,399,549	249	26	3.30	17	1.73	**43**	2.43	22	52
Missouri	172	5,915	2,565	8,480	2,180,531	257	22	3.72	3	1.17	**25**	2.95	16	47
Montana	302	10,326	2,720	13,046	3,386,894	260	35	3.39	4	1.47	**39**	2.99	13	8
Nevada	450	4,671	2,150	6,821	2,030,527	298	14	3.00	8	3.72	**22**	3.23	8	11
New Hampshire	5	17	21	38	8,574	226	....	....	....	....	....	....	....	....
New Jersey	7	989	373	1,362	404,054	297	4	4.04	....	....	**4**	2.93	4	11
New Mexico	118	1,009	1,415	2,424	643,005	265	2	1.98	3	2.12	**5**	2.06	2	3
New York	34	2,194	808	3,002	833,826	278	11	5.01	....	....	**11**	3.66	7	8
North Carolina	30	517	477	994	218,973	220	6	11.61	2	4.19	**8**	8.05	6	17
Ohio	4	173	19	192	50,604	264	....	....	....	....	....	....	....	....
Oklahoma	23	371	225	596	151,616	254	3	8.09	....	....	**3**	5.03	3	2
Oregon	225	718	561	1,279	208,531	163	1	1.39	....	....	**1**	.78	....	....
Pennsylvania	22	80	345	425	104,553	246	....	....	....	....	....	....	....	....
South Carolina	5	7	409	416	77,088	185	....	....	....	....	....	....	....	....
South Dakota	60	1,446	395	1,841	582,731	317	3	2.07	1	2.53	**4**	2.17	3	6
Tennessee	27	1,357	1,896	3,253	767,793	236	11	8.11	7	3.69	**18**	5.53	7	19
Texas	7	237	109	346	104,000	301	....	....	....	....	....	....	....	....
Utah	234	3,252	2,585	5,837	1,869,201	320	24	7.38	5	1.93	**29**	4.97	12	26
Vermont	5	76	36	112	29,698	265	....	....	....	....	....	....	....	....

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Virginia	25	638	1,239	1,877	498,414	266			2	1.61	2	1.07	1	2
Washington	188	561	304	865	118,113	137								
Wisconsin	38	1,658	918	2,576	643,464	250	11	6.63			11	4.27	3	7
Wyoming	60	248	232	480	98,034	204								
Total, 1914	**4,805**	**101,618**	**56,497**	**158,115**	**42,785,840**	**271**	**466**	**4.59**	**93**	**1.65**	**559**	**3.54**	**252**	**442**
Total, 1913	6,387	126,369	64,907	191,276	55,077,855	288	548	4.34	135	2.08	683	3.57	286	501
Total, 1912	5,967	110,056	59,143	169,199	48,498,510	287	522	4.74	139	2.35	661	3.91	273	520
Total, 1911	5,232	104,623	61,356	165,979	46,826,573	282	542	5.18	153	2.49	695	4.19	297	600

[a] Includes shaft accidents.

TABLE 17.—***ALL MINES:*** *Fatality and injury rates based upon actual time men were employed, and corresponding rates based upon a uniform year of 300 working days.*

State.	Average days worked, 1915.	Men employed.		Number of fatalities per 1,000 employed.		Number of serious injuries per 1,000 employed.		Number of slight injuries per 1,000 employed.	
		Actual number.	Equivalent in 300-day workers (calculated).	As reported.	On 300-day basis.	As reported.	On 300-day basis.	As reported.	On 300-day basis.
Alabama	269	4,956	4,438	2.42	2.51	85.75	89.06	217.11	225.48
Alaska	211	8,125	5,713	2.71	3.85	11.94	16.98	51.08	72.64
Arizona	295	14,057	13,839	2.92	2.96	88.00	89.39	268.69	272.92
Arkansas	238	685	544	1.46	1.84	13.14	16.54	29.20	36.76
California	304	10,414	10,545	4.71	4.65	60.50	59.74	220.66	217.92
Colorado	303	6,369	6,435	7.69	7.61	35.33	34.97	156.07	154.47
Connecticut	246	108	88	......	......	18.52	22.47	......	......
Florida	254	1,737	1,473	1.73	2.04	6.91	8.15	94.42	111.34
Georgia	213	295	209	3.39	4.78	10.17	14.35	81.36	114.83
Idaho	267	5,190	4,623	4.82	5.41	41.43	46.51	145.66	163.53
Illinois	299	384	383	7.81	7.83	26.04	26.11	106.77	107.05
Iowa	220	214	157	9.35	12.74	14.02	19.11	299.07	407.64
Kansas	172	435	249	4.60	8.03	29.89	52.21	91.95	160.64
Kentucky	242	174	140	......	......	......	......	51.72	63.83
Maine	189	105	66	......	......	19.05	30.30	9.52	15.15
Maryland	212	223	158	......	......	......	......	17.94	25.32
Massachusetts	237	86	68	......	......	11.63	14.71	116.28	147.06
Michigan	289	27,512	26,474	3.60	3.74	74.44	77.36	209.84	218.06
Minnesota	273	14,572	13,264	2.47	2.71	58.06	63.78	147.06	161.57
Missouri	262	9,570	8,354	4.60	5.27	23.71	27.17	189.24	216.76
Montana	296	13,846	13,679	4.48	4.53	36.76	37.21	215.01	217.63
Nevada	302	5,713	5,753	3.15	3.13	53.04	52.67	124.45	123.59
New Hampshire	247	41	34	......	......	......	......	......	......
New Jersey	309	1,745	1,798	5.16	5.01	53.30	51.72	142.12	137.93
New Mexico	275	2,732	2,504	1.46	1.60	32.58	35.54	127.01	138.58
New York	270	2,558	2,301	3.13	3.48	39.87	44.33	146.60	162.97
North Carolina	237	627	495	......	......	33.49	42.42	181.82	230.30
Ohio	251	265	222	7.55	9.01	37.74	45.05	71.70	85.59
Oklahoma	240	855	683	4.68	5.86	33.92	42.46	114.62	143.48
Oregon	209	1,070	745	1.87	2.68	9.35	13.42	32.71	46.98
Pennsylvania	249	384	318	2.60	3.14	13.02	15.72	7.81	9.43
South Carolina	240	487	390	......	......	4.11	5.13	8.21	10.26
South Dakota	325	1,796	1,945	3.34	3.08	66.26	61.18	257.24	237.53
Tennessee	251	2,821	2,363	2.84	3.39	35.09	41.90	182.56	217.94
Texas	306	294	300	3.40	3.33	13.61	13.33	149.66	146.67
Utah	335	5,449	6,086	4.22	3.78	43.49	38.94	250.87	224.61
Vermont	281	98	92	10.20	10.87	51.02	54.35	40.82	43.48
Virginia	220	1,976	1,450	.51	.69	9.11	12.41	75.40	102.76
Washington	158	715	377	5.59	10.61	19.58	37.14	16.78	31.83
Wisconsin	280	2,651	2,476	3.02	3.23	62.62	67.04	165.60	177.30
Wyoming	230	386	296	5.18	6.76	10.36	13.51	10.36	13.51
Other States	354	398	470	......	......	17.59	14.89	243.72	206.38
Total, 1915	**280**	**152,118**	**141,997**	**3.64**	**3.89**	**51.61**	**55.29**	**180.41**	**193.27**

ACCIDENTS CLASSIFIED BY MINING METHODS.

The bureau's report[a] for 1914 gave for the first time data relating to mine accidents classified by mining methods. Similar data for 1915 were collected, thus placing the results of two years' work on a comparative basis.

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[a] Fay, A. H., Metal-mine accidents in the United States during the calendar year 1914; Tech. Paper 129, Bureau of Mines, 1916, 96 pp.

Original from PRINCETON UNIVERSITY

TABLE 18.—*Summary of metal-mine accident data grouped by methods of mining. (1915.)*

Method of mining.	Number companies represented.	Number States represented.	Days active.	Total days labor.	Number men employed in mines.	Number 300-day workers.	Number killed.			Number seriously injured.			Number slightly injured.		
							Total.	Per 1,000 employed.	Per 1,000 300-day workers.	Total.	Per 1,000 employed.	Per 1,000 300-day workers.	Total.	Per 1,000 employed.	Per 1,000 300-day workers.
1. Room and pillar	52	15	275	2,042,948	7,417	6,810	**27**	3.64	3.97	**377**	50.82	55.36	**2,442**	329.24	358.59
2. Overhand stoping:															
(a) *With stulls*	*17*	*8*	*287*	*719,906*	*2,505*	*2,400*	**10**	*3.99*	*4.17*	**187**	*74.65*	*77.92*	**1,103**	*440.32*	*459.58*
(b) *With square-sets, cribs, etc*	*31*	*9*	*305*	*3,042,421*	*9,969*	*10,141*	**47**	*4.71*	*4.63*	**1,299**	*130.30*	*128.09*	**3,181**	*319.09*	*313.67*
(c) *With filling*	*62*	*10*	*319*	*6,796,774*	*21,304*	*22,656*	**99**	*4.64*	*4.37*	**1,431**	*67.17*	*63.16*	**6,223**	*292.10*	*274.66*
(d) *Shrinkage*	*28*	*11*	*347*	*1,722,448*	*4,963*	*5,741*	**36**	*7.25*	*6.27*	**544**	*109.61*	*94.76*	**1,700**	*342.53*	*296.11*
3. Underhand stoping	5	4	266	576,530	2,164	1,922	**11**	5.08	5.72	**265**	122.45	137.88	**711**	328.56	369.92
4. Caving methods	50	7	286	5,303,707	18,552	17,679	**67**	3.61	3.79	**1,511**	81.44	85.47	**4,290**	231.24	242.66
5. Open pit, with steam shovel	23	6	312	2,282,451	7,327	7,608	**24**	3.27	3.15	**352**	48.04	46.27	**1,556**	212.37	204.52
6. Open pit, without steam shovel	12	6	305	355,014	1,164	1,183	**3**	2.57	2.53	**30**	25.77	25.36	**112**	96.21	94.67
Total, 1915	**280**	....	**303**	**22,842,999**	**75,365**	**76,140**	**324**	**4.29**	**4.25**	**5,996**	**79.56**	**78.75**	**21,318**	**282.86**	**279.98**

Data relating to the classification of mine accidents, based on specific systems of mining, are essential for a comparative study of the risk in the different mining methods. The report cards sent to the operators at the close of 1914 and 1915 requested that the method of mining be reported with the statistics of accidents. With these reports as a basis, the bureau was able to select the returns from 258 mining companies in 1914 and 280 in 1915, representing 75 per cent of the metal-mining industry, whose records appear reasonably complete. Reports from companies whose data were not reasonably complete in all details were omitted in making this study. The figures given herein, therefore, include the actual number of men employed underground and in open-pit mines (excluding yard and shop men), with the corresponding number of accidents for each group. (See Table 18.)

In one mine the principal method of mining may be overhand stoping; but to a certain degree there must necessarily be some underhand stoping, a small amount of filling, and some room-and-pillar work. The methods as classified have been grouped, therefore, according to the principal method used, and in the majority of the cases represent more than 80 per cent of the total work at the individual properties. For the purpose of studying the mining risk, the returns received from the operators have been divided into six groups, representing the principal mining methods, as follows:

1. Room and pillar.
2. Overhand stoping:
    - (*a*) With stulls;
    - (*b*) With square sets, cribs, etc.;
    - (*c*) With filling;
    - (*d*) Shrinkage.
3. Underhand stoping.
4. Caving methods.
5. Open pit, with steam shovel.
6. Open pit, without steam shovel.

These different methods have been developed to work different types and classes of ore bodies, and inasmuch as ore bodies are fixed and definite, it is necessary to modify mining methods to meet the requirements of each ore body if the ore is to be extracted at minimum cost and with least loss. Safety should be the first consideration, although many other factors have to be taken into account in laying out a mine.

The bureau's report for 1914 presented two subdivisions under overhand stoping—namely, wide and massive ore bodies and narrow veins. This classification was therefore more nearly based on the type of ore body than on the mining method. The present classification, as outlined above, is strictly on a mining-method basis, and should more nearly represent actual conditions than did the earlier reports.

ROOM-AND-PILLAR METHOD.

The figures covering mines in which the room-and-pillar method is used represent the returns of 52 mining companies, employing 7,417 men (surface shops excluded). The mines include 32 lead and zinc mines in the Mississippi Valley, 4 iron mines in Alabama; 3 in Minnesota, 2 in Virginia, and 1 each in Missouri, North Carolina, Tennessee, Wisconsin; 1 copper mine, 2 gypsum mines, and 4 gold mines. Comparison of the number of fatalities and of injuries during 1914 and 1915 in mines using the room-and-pillar method is shown in the accompanying table.

Number killed and injured in mines using **room-and-pillar** *method of mining during the calendar years 1914 and 1915.*

Cause.	Killed.		Injured.	
	1914	1915	1914	1915
Falls of rock	22	17	465	401
Run of ore in stope, chute, or bin	1		726	746
Explosives	8	7	70	45
Haulage	8		718	429
Falls of persons	2	1	54	29
Miscellaneous	4		1,057	1,045
Shaft	3	2	81	124
Total	48	27	3,171	2,819
Per 1,000, 300-day workers	5.73	3.97	378.63	413.95

Room-and-pillar mining is especially adapted to sheet-ground deposits, lying approximately flat, and little or no timbering is used other than an occasional prop. The roof is entirely supported by pillars of ore 15 to 25 feet in diameter, depending upon the thickness of the ore body and the condition of the roof. These are left, as a rule, where the roof conditions demand, without regard to regularity. Sometimes the pillars are the poorest ore in the mine and are not recovered, and sometimes, where the ore is of average richness, the pillars are drawn after the rooms have been worked out.

As would be expected, the number of fatalities and injuries due to falls of persons is the lowest, whereas the number of accidents due to falls of roof is very high, representing in 1915 about 63 per cent of the total fatalities in this group of mines, or about the same as in underhand stoping.

Fatalities (Table 19) and injuries (Table 20) due to explosives are much higher, because large faces of ore are exposed and heavy charges of dynamite are used. When these flat ore bodies are mined large open spaces are left, and the danger from flying pieces of rock and ore from blasts is increased because the men can not get to proper shelter so readily before the shots are fired.

The fatality rate in the room-and-pillar mines considered was 3.97 in 1915 as compared with 5.73 per 1,000 of 300-day workers in 1914. Table 18 gives comparative figures for the six groups during 1915.

TABLE 19.—***FATALITIES**, classified by principal causes and mining methods, 1914 and 1915.*

Method of mining.	Number killed.																						
	By falls of rock.			By run or fall of ore while loading at chute, bin, or working face.			By explosives.			By haulage.			By falls of persons.			Miscellaneous.			In shaft.			Total.	
	1 and 31.			**2, 7, and 37.**			**4 and 32.**			**5 and 33.**			**6 and 35.**			**3, 8, 9, 10, 11, 12, 13, 14, 15, 34, 36, 38, 39, 40, and 41.**			**16, 17, 18, 19, 20, and 21.**				
	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	**Number.**	Rate per 1,000 300-day workers.
1915.																							
Room and pillar	17	62.96	2.50	......	......	......	7	25.93	1.03	......	......	......	1	3.70	0.15	......	......	......	2	7.41	0.29	**27**	3.97
Overhand stoping	89	46.35	2.17	10	5.21	0.24	16	8.33	.39	9	4.69	0.22	21	10.94	.51	13	6.77	0.32	34	17.71	.83	**192**	4.69
(*a*) *With stulls*	*4*	*40.00*	*1.67*	......	......	......	......	......	......	......	......	......	*2*	*20.00*	*.83*	......	......	......	*4*	*40.00*	*1.67*	**10**	*4.17*
(*b*) *With square-sets, cribs, etc*	*26*	*55.31*	*2.56*	*1*	*2.13*	*.10*	*2*	*4.26*	*.20*	......	......	......	*5*	*10.64*	*.49*	*3*	*6.38*	*.30*	*10*	*21.28*	*.99*	**47**	*4.64*
(*c*) *With filling*	*44*	*44.45*	*1.94*	*5*	*5.05*	*.22*	*10*	*10.10*	*.44*	*6*	*6.06*	*.27*	*9*	*9.09*	*.40*	*10*	*10.10*	*.44*	*15*	*15.15*	*.66*	**99**	*4.37*
(*d*) *Shrinkage*	*15*	*41.67*	*2.61*	*4*	*11.11*	*.70*	*4*	*11.11*	*.70*	*3*	*8.33*	*.52*	*5*	*13.89*	*.87*	......	......	......	*5*	*13.89*	*.87*	**36**	*6.27*
Underhand stoping	7	63.64	3.64	1	9.09	.52	1	9.09	.52	1	9.09	.52	......	......	......	......	......	......	1	9.09	.52	**11**	5.72
Caving methods	34	50.74	1.92	4	5.97	.23	8	11.94	.45	2	2.99	.11	8	11.94	.45	7	10.45	.40	4	5.97	.23	**67**	3.79
Open pit, with steam shovel	4	16.67	.53	......	......	......	1	4.17	.13	16	66.66	2.10	......	......	......	3	12.50	.39	......	......	......	**24**	3.15
Open pit, without steam shovel	1	33.33	.84	......	......	......	......	......	......	......	......	......	1	33.33	.84	1	33.33	.84	......	......	......	**3**	2.53
Total, 1915	**152**	**46.91**	**2.00**	**15**	**4.63**	**.20**	**33**	**10.19**	**.43**	**28**	**8.64**	**.37**	**31**	**9.26**	**.41**	**24**	**7.72**	**.31**	**41**	**12.65**	**.54**	**324**	**4.26**
1914.																							
Room and pillar	22	45.83	2.63	1	2.08	0.12	8	16.67	.95	8	16.67	0.95	2	4.17	0.24	4	8.33	0.48	3	6.25	0.36	**48**	5.73
Overhand stoping (narrow)	16	35.56	1.66	......	......	......	6	13.33	.62	1	2.22	.10	4	8.89	.41	2	4.44	.21	16	35.56	1.66	**45**	4.66
Overhand stoping (wide)	61	44.85	2.37	3	2.21	.12	11	8.09	.43	7	5.15	.27	21	15.44	.81	6	4.41	.23	27	19.85	1.05	**136**	5.28
Caving methods	42	40.78	2.20	2	1.94	.11	7	6.80	.37	9	8.74	.47	6	5.82	.31	12	11.65	.63	25	24.27	1.31	**103**	5.40
Open pit, with steam shovel	5	20.84	.57	......	......	......	8	33.33	.91	8	33.33	.91	......	......	......	3	12.50	.34	......	......	......	**24**	2.73
Open pit, without steam shovel	4	80.00	2.39	......	......	......	......	......	......	1	20.00	.60	......	......	......	......	......	......	......	......	......	**5**	2.99
Total, 1914	**150**	**41.55**	**2.05**	**6**	**1.66**	**.08**	**40**	**11.08**	**.54**	**34**	**9.42**	**.46**	**33**	**9.14**	**.45**	**27**	**7.48**	**.37**	**71**	**19.67**	**.97**	**361**	**4.92**

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TABLE 20.—*Injuries classified by principal causes and* ***mining methods****, 1914 and 1915.*

Method of mining.	Number injured.																						
	By falls of rock.			By run or fall of ore while loading at chute, bin, or working face.			By explosives.			By haulage.			By falls of persons.			Miscellaneous.			In shaft.			Total.	
	1 and 31.			**2, 7, and 37.**			**4 and 32.**			**5 and 33.**			**6 and 35.**			**3, 8, 9, 10, 11, 12, 13, 14, 15, 34, 36, 38, 39, 40, and 41.**			**16, 17, 18, 19, 20, and 21.**				
	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	Number.	Per cent of total.	Rate per 1,000 300-day workers.	**Number.**	Rate per 1,000 300-day workers.
1915.																							
Room and pillar	401	14.22	58.88	746	26.46	109.54	45	1.60	6.61	429	15.22	63.00	29	1.03	4.26	1,045	37.07	153.45	124	4.40	18.21	**2,819**	413.95
Overhand stoping	3,579	22.84	87.42	2,922	18.65	71.38	134	.86	3.27	1,771	11.30	43.26	519	3.31	12.68	6,391	40.79	156.11	352	2.25	8.60	**15,668**	382.72
(a) *With stulls*	*148*	*11.47*	*61.67*	*99*	*7.68*	*41.25*	*11*	*.85*	*4.58*	*130*	*10.08*	*54.16*	*24*	*1.86*	*10.00*	*862*	*66.82*	*359.17*	*16*	*1.24*	*6.67*	*1,290*	*537.50*
(b) *With square-sets, cribs, etc*	*1,041*	*23.24*	*102.65*	*1,319*	*29.44*	*130.07*	*46*	*1.03*	*4.54*	*565*	*12.61*	*55.71*	*94*	*2.10*	*9.27*	*1,309*	*29.22*	*129.08*	*106*	*2.36*	*10.45*	*4,480*	*441.77*
(c) *With filling*	*1,887*	*24.65*	*83.29*	*1,072*	*14.01*	*47.32*	*36*	*.47*	*1.59*	*854*	*11.16*	*37.69*	*335*	*4.38*	*14.79*	*3,315*	*43.31*	*146.32*	*155*	*2.02*	*6.84*	*7,654*	*337.84*
(d) *Shrinkage*	*503*	*22.42*	*87.61*	*432*	*19.25*	*75.25*	*41*	*1.83*	*7.14*	*222*	*9.89*	*38.67*	*66*	*2.94*	*11.50*	*905*	*40.33*	*157.64*	*75*	*3.34*	*13.06*	*2.244*	*390.87*
Underhand stoping	53	5.43	27.58	248	25.41	129.03	17	1.75	8.84	329	33.71	171.18	6	.62	3.12	312	31.96	162.33	11	1.13	5.72	**976**	507.81
Caving methods	1,879	32.39	106.29	486	8.38	27.49	66	1.14	3.73	794	13.69	44.91	142	2.45	8.03	2,267	39.08	128.23	167	2.88	9.45	**5,801**	328.13
Open pit, with steam shovel	449	23.53	59.02	8	.42	1.05	38	1.99	4.99	194	10.17	25.50	179	9.38	23.53	1,040	54.50	136.70	......	......	......	**1,908**	250.79
Open pit, without steam shovel	16	11.27	13.53	1	.70	.84	1	.70	.84	22	15.49	18.60	9	6.34	7.61	93	65.49	78.61	......	......	......	**142**	120.03
Total, 1915	**6,377**	**23.35**	**83.75**	**4,411**	**16.15**	**57.93**	**301**	**1.10**	**3.95**	**3,539**	**12.96**	**46.48**	**884**	**3.24**	**11.61**	**11,148**	**40.81**	**146.42**	**654**	**2.39**	**8.59**	**27,314**	**358.73**
1914.																							
Room and pillar	465	14.66	55.52	726	22.90	86.69	70	2.21	8.36	718	22.64	85.73	54	1.70	6.45	1,057	33.33	126.21	81	2.56	9.67	**3,171**	378.63
Overhand stoping (narrow)	870	27.81	90.00	585	18.70	60.51	31	.99	3.21	353	11.29	36.52	134	4.28	13.86	1,075	34.37	111.20	80	2.56	8.28	**3,128**	323.58
Overhand stoping (wide)	2,190	23.69	84.95	1,935	20.93	75.06	94	1.02	3.65	1,191	12.88	46.20	422	4.57	16.37	3,202	34.64	124.20	210	2.27	8.14	**9,244**	358.57
Caving	2,045	32.48	107.33	598	9.50	31.39	79	1.26	4.15	781	12.40	40.99	143	2.27	7.50	2,450	38.91	128.59	200	3.18	10.50	**6,296**	330.45
Open pit, with steam shovel	425	18.50	48.30	......	......	......	107	4.66	12.16	271	11.80	30.80	238	10.36	27.05	1,256	54.68	142.74	......	......	......	**2,297**	261.05
Open pit, without steam shovel	59	31.71	35.22	3	1.76	1.79	5	2.94	2.98	28	16.47	16.72	11	6.47	6.57	64	37.65	38.21	......	......	......	**170**	101.49
Total, 1914	**6,054**	**24.91**	**82.54**	**3,847**	**15.83**	**52.45**	**386**	**1.59**	**5.26**	**3,342**	**13.75**	**45.56**	**1,002**	**4.12**	**13.66**	**9,104**	**37.45**	**124.12**	**571**	**2.35**	**7.78**	**24,306**	**331.37**

OVERHAND STOPING.

Overhand stoping has a wide range of application and is used extensively in wide and narrow ore bodies with inclinations ranging from horizontal to vertical. The figures collected for the year 1915 are classified in accordance with the mining methods as: Overhand stoping with stulls; with square sets, cribs, etc.; with filling; and shrinkage. In order to compare the accident rates in overhand stoping for 1914 with those of 1915 it was necessary to combine the figures for narrow veins and wide veins given in last year's report and also to combine the overhand-stoping figures for 1915 into one group as shown in the accompanying table.

Number killed and injured in mines where **overhand stoping** *is principal method used during the calendar years 1914 and 1915.*

Cause.	Killed.		Injured.	
	1914	1915	1914	1915
Falls of rock	77	89	3,060	3,579
Run of ore in stope, chute, or bin	3	10	2,520	2,922
Explosives	17	16	125	134
Haulage	8	9	1,544	1,771
Falls of persons	25	21	556	519
Miscellaneous	8	13	4,277	6,391
Shaft	43	35	290	352
Total	181	193	12,372	15,668
Per 1,000 300-day workers	5.11	4.71	345.91	382.72

Furthermore, the nonfatal injuries of 1914 were divided into two classes—slight injuries of less than 20 days' disability, and serious injuries resulting in more than 20 days off duty, whereas the division for 1915 was on the 14-day basis. It was, therefore, necessary to combine all nonfatal injuries for both groups of mines and these are presented in the accompanying table. It will be noted that the fatality rate for 1914 for all overhand stoping was 5.11, whereas the fatality rate for 1915 was 4.71. The number of nonfatal injuries for 1914 was 345.91 per 1,000 300-day workers; for 1915 the number reported was 382.72 per 1,000 300-day workers.

The increase in the number of nonfatal injuries does not necessarily mean that there has been an increase in the hazard in this or any group of mines. It largely means more accurate and efficient reporting in compliance with inspection and compensation laws. Furthermore, most of the companies reporting have had several years' experience in keeping records and the figures show that their records are more complete than in former years.

Table 19 shows the percentage of fatalities and the fatality rates per 1,000 of 300-day workers by each mining method as outlined. It is difficult to make comparisons one year with another, as the figures are somewhat erratic by reason of the fact that each group is comparatively small. Only by collecting similar data for a series of years will it be possible to make definite and positive comparisons of one method with another.

With reference to the hazard in overhand stoping it is doubtful whether the ore chutes used in working large ore bodies are as well guarded as they should be. Usually the chutes are cribbed to the top of the loose ore or rock, but frequently no vertical timbers protrude above their top, and a man may easily fall into such an opening. In square sets the floors are often in poor condition, with many broken and loose planks and unguarded openings through which a man may fall, even if he is cautious in his movements.

There is likely to be much drill dust in the air in all overhand stoping, as the men are drilling "uppers." The powdered rock falls directly in front of the miner and is intimately mixed with the air he breathes. In underhand stoping it is an easy matter to keep the holes filled with water and thus allay the dust, whereas with overhand stoping a somewhat complicated mechanical equipment is required to accomplish the same result.

When overhand stoping is used without timber the men have a secure scaffolding of ore and waste rock on which to work, and the danger of falling through the timbering, as in places where square sets or other timbering methods are used, is eliminated. Hence the fatality rate from falls of persons is about one-half as great in mines using filling as in the case where stulls are used.

OVERHAND STOPING WITH STULLS.

Overhand stoping with stulls is confined largely to narrow ore veins and to those that are steeply inclined. The returns tabulated in this group are from 8 States and represent 17 mining companies, employing 2,505 men. These represent 1 copper mine in Michigan, 2 iron mines in Michigan, and 1 in Alabama, and 4 gold mines in California, 3 in Colorado, and 3 in Nevada. Of the total number of men employed in this group of mines 10 were killed and 187 seriously injured, and 1,103 slightly injured. Four of the fatalities were due to fall of rock, 4 to shaft accidents, and 2 to a man falling down chute or winze. The nonfatal injury rate appears to be the highest of any group, being 537.50 per 1,000 300-day workers, as shown in Table 20.

TABLE 21.—*Metal-mine accidents in 1915,*

Kind of mine.	Underground.									
	Fall of rock or ore from roof or wall.	Rock or ore while loading at working face.	Timber or hand tools.	Explosives.	Haulage accidents.	Falling down chute, winze, raise, or stope.	Run of ore from chute or pocket.	Drilling accidents.	Electricity.	Machinery (not including locomotives or drills).
	1	2	3	4	5	6	7	8	9	10
NUMBER KILLED.										
Room and pillar	17			7		1				
Overhand stoping:										
(*a*) With stulls	4					2				
(*b*) With square sets, cribs, etc	26		1	2		5	1		2	
(*c*) With filling	44	3	1	10	6	9	2		7	
(*d*) Shrinkage	15	2		4	3	5	2			
Underhand stoping	7			1	1		1			
Caving methods	34	1	3	8	2	8	3		1	
Open pit, with steam shovel										
Open pit, without steam shovel										
Total fatalities, 1915	**147**	**6**	**5**	**32**	**12**	**30**	**9**		**10**	
Total fatalities, 1914	141	4	2	32	25	33	2	1	6	1
NUMBER SERIOUSLY INJURED. [Time lost, more than 14 days.]										
Room and pillar	69	46	13	17	81	9	19	20	1	5
Overhand stoping:										
(*a*) With stulls	40	10	13	4	33	9	3	31	2	7
(*b*) With square sets, cribs, etc	315	314	109	15	213	24	57	68		10
(*c*) With filling	467	114	193	13	215	94	20	89	4	12
(*d*) Shrinkage	138	62	37	20	72	23	19	41	2	1
Underhand stoping	12	72	19	7	104			41		3
Caving methods	456	98	255	31	270	63	18	61	7	6
Open pit, with steam shovel										
Open pit, without steam shovel										
Total serious injuries, 1915	**1,497**	**716**	**639**	**107**	**988**	**222**	**136**	**351**	**16**	**44**
Total serious injuries, 1914 [a]	993	394	400	101	608	164	80	149	4	32
NUMBER SLIGHTLY INJURED. [Time lost, 1 to 14 days.]										
Room and pillar	332	610	128	28	348	20	71	191	5	36
Overhand stoping:										
(*a*) With stulls	108	69	70	7	97	15	17	232	5	282
(*b*) With square sets, cribs, etc	726	789	253	31	352	70	159	195	3	9
(*c*) With filling	1,420	834	987	23	639	241	104	426	16	16
(*d*) Shrinkage	365	276	154	21	150	43	75	176	4	3
Underhand stoping	41	176	68	10	225	6		58		9
Caving methods	1,423	318	666	35	524	79	52	222	17	28
Open pit, with steam shovel										
Open pit, without steam shovel										
Total slight injuries, 1915	**4,415**	**3,072**	**2,326**	**155**	**2,335**	**474**	**478**	**1,500**	**50**	**383**
Total slight injuries, 1914 [b]	4,577	2,857	2,179	173	2,435	589	513	1,181	39	129
All serious and slight injuries, 1915	**5,912**	**3,788**	**2,965**	**262**	**3,323**	**696**	**614**	**1,851**	**66**	**427**
All serious and slght injuries, 1914	5,570	3,251	2,579	274	3,043	753	593	1,330	43	161

[a] Serious injury in 1914 represents a loss of 20 days or more; in 1915 a loss of **more than 14 days.**
[b] A slight injury in 1914 represents a loss of 1 to 19 days; in 1915, 1 to 14 days.

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by causes, grouped by mining methods.

NUMBER KILLED.

Underground—Continued.						Shaft.						
Mine fires.	Suffocation from natural gases.	Inrush of water.	Stepping on nail.	Other causes.	**Total, underground.**	Falling down shafts.	Objects falling down shafts.	Breaking of cables.	Overwinding.	Skip or cage.	Other causes.	**Total, shaft.**
11	**12**	**13**	**14**	**15**		**16**	**17**	**18**	**19**	**20**	**21**	
......	......	......	......	......	**25**	1	......	1	......	......	......	**2**
......	......	......	......	......	**6**	......	2	......	......	1	1	**4**
......	......	......	......	......	**37**	2	1	......	......	6	1	**10**
......	......	......	1	1	**84**	5	4	1	1	3	1	**15**
......	......	......	......	......	**31**	2	......	......	......	1	2	**5**
......	......	......	......	......	**10**	1	......	......	......	......	......	**1**
......	1	......	......	2	**63**	1	1	......	......	1	1	**4**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
......	1	......	1	3	**256**	12	8	2	1	12	6	**41**
2	......	8	......	4	**261**	22	7	......	......	33	9	**71**

NUMBER SERIOUSLY INJURED. [Time lost, more than 14 days.]

3	2	3	7	49	**344**	......	12	......	......	16	5	**33**
4	......	......	......	26	**182**	1	1	......	......	3	......	**5**
2	1	......	5	140	**1,273**	5	10	......	......	3	8	**26**
10	3	1	25	128	**1,388**	2	8	......	1	23	9	**43**
......	1	......	3	86	**505**	6	6	......	......	10	17	**39**
......	......	......	......	4	**262**	......	1	......	......	1	1	**3**
1	6	......	16	177	**1,465**	2	12	......	......	18	14	**46**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
20	**13**	**4**	**56**	**610**	**5,419**	**16**	**50**	......	**1**	**74**	**54**	**195**
4	3	......	10	408	**3,350**	15	27	1	1	65	40	149

NUMBER SLIGHTLY INJURED. [Time lost, 1 to 14 days.]

12	7	18	96	449	**2,351**	1	45	1	......	24	20	**91**
2	14	2	35	137	**1,092**	1	4	......	......	4	2	**11**
1	7	......	16	490	**3,101**	5	34	......	......	7	34	**80**
5	11	4	262	1,123	**6,111**	3	54	......	......	27	28	**112**
......	11	......	39	347	**1,664**	......	6	......	......	11	19	**36**
......	1	......	8	101	**703**	......	2	1	......	4	1	**8**
......	7	......	110	688	**4,169**	5	40	1	......	34	41	**121**
......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......
20	**58**	**24**	**566**	**3,335**	**19,191**	**15**	**185**	**3**	......	**111**	**145**	**459**
2	12	12	205	3,015	**17,918**	19	122	2	1	153	125	**422**
40	**71**	**28**	**622**	**3,945**	**24,610**	**31**	**235**	**3**	**1**	**185**	**199**	**654**
6	15	12	215	3,423	**21,268**	34	149	3	2	218	165	**571**

TABLE 21.—*Metal-mine accidents in 1915, by*

NUMBER KILLED.

Method of mining.	Surface.									
	Mine cars, mine locomotives, or aerial trams.	Railway cars and locomotives.	Run or fall of ore in or from ore bins.	Falls of persons.	Stepping on nail.	Hand tools, axes, bars, etc.	Electricity.	Machinery.	Other causes.	**Total, surface.**
	22	23	24	25	26	27	28	29	30	
Room and pillar										
Overhand stoping:										
(*a*) With stulls										
(*b*) With square sets, cribs, etc										
(*c*) With filling										
(*d*) Shrinkage										
Underhand stoping										
Caving methods										
Open pit, with steam shovel										
Open pit, without steam shovel										
Total fatalities, 1915										
Total fatalities, 1914										

NUMBER SERIOUSLY INJURED. **[Time lost, more than 14 days.]**

Method of mining.	22	23	24	25	26	27	28	29	30	**Total, surface.**
Room and pillar										
Overhand stoping:										
(*a*) With stulls										
(*b*) With square sets, cribs, etc										
(*c*) With filling										
(*d*) Shrinkage										
Underhand stoping										
Caving methods										
Open pit, with steam shovel										
Open pit, without steam shovel										
Total serious injuries, 1915										
Total serious injuries, 1914 [a]										

NUMBER SLIGHTLY INJURED. **[Time lost, 1 to 14 days.]**

Method of mining.	22	23	24	25	26	27	28	29	30	**Total, surface.**
Room and pillar										
Overhand stoping:										
(*a*) With stulls										
(*b*) With square sets, cribs, etc										
(*c*) With filling										
(*d*) Shrinkage										
Underhand stoping										
Caving methods										
Open pit, with steam shovel										
Open pit, without steam shovel										
Total slight injuries, 1915										
Total slight injuries, 1914 [b]										
All serious and slight injuries, 1915										
All serious and slight injuries, 1914										

[a] Serious injury in 1914 represents a loss of 20 days or more; in 1915 a loss of more than 14 days.

[b] A slight injury in 1914 represents a loss of 1 to 19 days; in 1915, 1 to 14 days.

causes, grouped by mining methods—Continued.

NUMBER KILLED.

Open pit.												Grand total.	
Falls or slides of rock or ore.	Explosives.	Haulage accidents (locomotives, etc.).	Steam shovels.	Falls of persons.	Falls of derricks, booms, etc.	Run or fall of ore in or from ore bins.	Machinery (other than locomotives or steam shovels).	Electricity.	Hand tools.	Other causes.	Total, open pit.		
31	32	33	34	35	36	37	38	39	40	41		1915	1914
......	......	......	......	......	......	......	......	......	......	......	......	27	48
......	......	......	......	......	......	......	......	......	......	......	......	10	181
......	......	......	......	......	......	......	......	......	......	......	......	47	
......	......	......	......	......	......	......	......	......	......	......	......	99	
......	......	......	......	......	......	......	......	......	......	......	......	36	
......	......	......	......	......	......	......	......	......	......	......	......	11	
......	......	......	......	......	......	......	......	......	......	......	......	67	103
4	1	16	1	......	1	......	......	......	......	1	24	24	24
1	......	......	......	1	......	......	......	......	......	1	3	3	5
5	1	16	1	1	1	......	......	......	......	2	27	324	......
9	8	9	1	......	......	......	2	......	......	......	29	......	361

NUMBER SERIOUSLY INJURED. [Time lost, more than 14 days.]

......	......	......	......	......	......	......	......	......	......	......	......	377	323
......	......	......	......	......	......	......	......	......	......	......	......	187	1,907
......	......	......	......	......	......	......	......	......	......	......	......	1,299	
......	......	......	......	......	......	......	......	......	......	......	......	1,431	
......	......	......	......	......	......	......	......	......	......	......	......	544	
......	......	......	......	......	......	......	......	......	......	......	......	265	
......	......	......	......	......	......	......	......	......	......	......	......	1,511	1,269
117	9	49	17	23	2	3	9	......	29	94	352	352	370
4	......	7	......	4	......	......	7	......	1	7	30	30	30
121	9	56	17	27	2	3	16	......	30	101	382	5,996	......
77	32	71	30	27	2	......	14	2	39	106	400	......	3,899

NUMBER SLIGHTLY INJURED. [Time lost, 1 to 14 days.]

......	......	......	......	......	......	......	......	......	......	......	......	2,442	2,848
......	......	......	......	......	......	......	......	......	......	......	......	1,103	10,465
......	......	......	......	......	......	......	......	......	......	......	......	3,181	
......	......	......	......	......	......	......	......	......	......	......	......	6,223	
......	......	......	......	......	......	......	......	......	......	......	......	1,700	
......	......	......	......	......	......	......	......	......	......	......	......	711	
......	......	......	......	......	......	......	......	......	......	......	......	4,290	5,027
332	29	145	68	156	4	5	33	2	147	635	1,556	1,556	1,927
12	1	15	......	5	3	1	18	1	11	45	112	112	140
344	30	160	68	161	7	6	51	3	158	680	1,668	21,318	......
407	80	228	116	222	2	3	65	2	219	723	2,067	......	20,407
465	39	216	85	188	9	9	67	3	188	781	2,050	27,314	......
484	112	299	146	249	4	3	79	4	258	829	2,467	......	24,306

OVERHAND STOPING WITH SQUARE SETS, CRIBS, ETC.

The returns tabulated under "Overhand stoping with square sets, cribs, etc.," include 31 companies from 8 States, as follows: 5 copper mines in Arizona, 1 in California, and 13 in Michigan, 2 iron mines in Minnesota, and 4 gold mines in Colorado. This group employed 9,969 men and the average number of days worked during the year was 305. Of the total number employed 47 men were killed; 1,299 seriously injured, and 3,381 slightly injured, making the fatality rate 4.71, and the total nonfatal injury rate 441.77 per 1,000 300-day workers. There were only 2 fatalities due to explosives, while falls of rock were responsible for 26, or 55.31 per cent.

OVERHAND STOPING WITH FILLING.

The number of companies represented in the group of mines classified under "Overhand stoping with filling" is 62, employing 21,304 men and averaging 319 days active for the year. These mines are distributed throughout 10 States as follows: 1 copper mine in Alaska, 5 in Arizona, 2 in Montana, 3 in Utah, and 1 in New Mexico; 14 gold mines in California, 4 in Colorado, and 6 in Nevada; and 10 mines in the Coeur d'Alene district of Idaho. The number of men killed and injured is as follows: Killed 99, seriously injured 1,431, and slightly injured 6,223. The fatality rate is 4.67, and the total nonfatal injury rate is 337.82 per 1,000 300-day workers.

SHRINKAGE STOPING.

The number of companies represented under "Shrinkage stoping" is 28, employing 4,963 men and distributed among 11 States. This group consists largely of gold mines in Alaska, Arizona, California, Colorado, and Montana. It also includes 2 copper mines in Alaska and 3 in Arizona. The number killed was 36, seriously injured 544, and slightly injured 1,700, representing a fatality rate of 6.27 and a nonfatal injury rate of 390.87 per 1,000 300-day workers. The fatality rate for this group is higher than any other; the principal causes of accidents being falls of rock, falls of persons, shaft accidents, explosives, and run of ore.

UNDERHAND STOPING.

There is presented herewith for the first time separate data on underhand stoping, including the returns of 5 companies employing 2,164 men. These represent 2 iron mines in Michigan; 1 iron mine in Alabama; 1 zinc mine each in Tennessee and Wisconsin. The number of men killed was 11, which shows the second highest fatality rate, or 5.72 per 1,000 300-day workers. The number of injuries is also high, being 265 serious and 711 slight injuries, or a combined nonfatal injury rate of 507.80 per 1,000 300-day workers.

These data cover only a limited number of mines, but are sufficient to point out some of the principal hazards connected with this particular method of mining. In underhand stoping the men are working downward so that they are too far from the roof to be able to test it thoroughly, as they can do when working in the various overhand stoping methods.

On account of the frequently great height from the working floor to the roof a very small piece of rock may fall and injure a man as severely as a larger piece falling only 5 or 6 feet, which would usually be the case with overhand methods. Of the total fatalities 63.64 per cent were due to falls of roof (see Table 19) as compared with 40 to 55 per cent in the various overhand stoping methods. In the mines reported there were no fatalities due to falls of persons at mines using underhand stoping, but in overhand stoping 9 to 20 per cent of the fatalities are due to this cause.

Number killed and injured in mines where **underhand stoping** *is principal method used during the calendar years 1914 and 1915.*

Cause.	Killed.		Injured.	
	1914[a]	1915	1914[a]	1915
Falls of rock		7		53
Run of ore in stope, chute, or bin		1		248
Explosives		1		17
Haulage		1		329
Falls of persons				6
Miscellaneous				312
Shaft		1		11
Total		11		976
Per 1,000 300-day workers		5.72		507.80

[a] No data available.

CAVING SYSTEMS.

The data relating to this system of mining include the returns of 50 companies operating mines in 7 different States and employing 18,552 men, including largely the iron mines in Minnesota and Michigan, and a number of copper mines in Arizona, California, and Utah.

Many different names are applied to caving systems, but the principle is similar for all the systems. A certain system may be employed in different States, but be known by local names, as, for example, the name of the mine foreman who introduced it at a mine after having gained his knowledge of it at some iron mine in Michigan or Minnesota. The methods included in this classification include top slicing, substoping, block caving, pillar caving, etc., and the preliminary work that is absolutely necessary for all caving systems.

The fatality rate for this group of mines, as shown in the accompanying table, is 3.79 per 1,000 300-day workers, as compared with

3.97 for room and pillar, and 4.71 for overhand stoping. The fatalities due to falls of rock, as indicated in Table 19, are slightly less than in mining by room and pillar and by underhand stoping. The injuries (Table 20) are 328.13 per 1,000 300-day workers, while in overhand stoping they are 382.72, and in room and pillar 413.95 per 1,000.

Number killed and injured in mines using the **caving** *system of mining during the calendar years 1914 and 1915.*

Cause.	Killed.		Injured.	
	1914	1915	1914	1915
Falls of rock	42	34	2,045	1,879
Run of ore in stope, chute, or bin	2	4	598	486
Explosives	7	8	79	66
Haulage	9	2	781	794
Falls of persons	6	8	143	142
Miscellaneous	12	7	2,450	2,267
Shaft	25	4	200	167
Total	103	67	6,296	5,801
Per 1,000 300-day workers	5.41	3.79	330.44	328.13

OPEN-PIT MINING WITH STEAM SHOVEL.

The returns from mines that use the open-pit method of mining with steam shovels represent 23 operating companies, employing 7,327 men (surface shops excluded). Of the 23 companies, 12 in Minnesota and 5 in Alabama are iron-mine operators, and 1 each in Nevada, New Mexico, and Utah operates a copper mine.

The controlling factors in the choice of this method of mining are the areal extent, elevation with respect to the surrounding country, amount of overburden, and depth to which the deposit extends. The steam shovel may be used in handling massive deposits of a wide range of hardness, although it is best adapted for use with those ores that break into fragments readily. Work at these open-pit mines is conducted on a scale comparable with railroad operations, inasmuch as most of the ore is loaded direct by steam shovel into railroad cars operated by standard locomotives. The accident hazard includes many of the dangers to which railroad employees are exposed.

The number killed in 1915 was 24, the same as in 1914, whereas there were 1,908 nonfatal injuries, as compared with 2,297 in 1914. The rates per 1,000 300-day workers for 1914 and 1915, respectively, are: Fatalities, 2.73 and 3.16; nonfatal injuries, 261 and 250.79. Only 1 fatality resulted from explosives, as compared with 8 in 1914. There were 16 fatalities due to haulage systems, as compared with 8 in 1914.

The number of injuries—250.79—is considerably higher than the number—120.03—in the open-pit mines not using steam shovels. This difference is largely due to the machinery about the shovel, to the

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necessity of adjusting and placing the steam shovel, and to accidents from railroad operations, such as coupling cars, throwing switches, and laying track. Furthermore, the companies operating with steam shovels have generally reached the stage where more complete records are kept.

Number killed and injured in **open-pit** *mines where the ore is mined by steam shovel during the calendar years 1914 and 1915.*

Cause.	Killed.		Injured.	
	1914	1915	1914	1915
Falls of rock	5	4	425	449
Run of ore in stope, chute, or bin	....	....	....	8
Explosives	8	1	107	38
Haulage	8	16	271	194
Falls of persons	....	....	238	179
Miscellaneous	3	3	1,256	1,040
Shaft	....	....	....	....
Total	24	24	2,297	1,908
Per 1,000 300-day workers	2.73	3.16	261.00	250.79

OPEN-PIT MINING WITHOUT STEAM SHOVEL.

As regards the open-pit mines without steam shovels, the returns represent 12 operators, employing 1,164 men, as compared with 2,192 in 1914, and include 6 phosphate mines in Florida and Tennessee, 1 iron mine each in Virginia and Michigan, 1 copper mine in Alaska, and 2 in Arizona.

In the open-pit work without steam shovels the ore is blasted down from the bank, loaded directly into small tramcars, and dumped into bins or railroad cars. This method of working, however, is becoming more or less obsolete and is being supplanted by the use of drag lines or wheel scrapers, and, where the deposits are large enough, of steam shovels. The number of men killed and injured were: Killed 3, seriously injured 30, and slightly injured 112, giving reasonably low accident rates, as shown in Table 18.

As regards safety the figures given in the accompanying tables indicate that the system under consideration is safer than any other system, yet the number of men involved is not large enough to permit the making of a definite statement to this effect. The method is, however, more or less comparable with quarry work, figures for which are given in an accompanying table. All of the open-pit work is conducted where there is plenty of light, thus giving the miner an opportunity to see conditions as they exist. Furthermore, the air is good and in most cases there is ample room for the miner to keep out of the way of any falling material.

Number killed and injured in **open-pit** *mines where no steam shovels are used during the calendar years 1914 and 1915.*

Cause.	Killed.		Injured.	
	1914	1915	1914	1915
Falls of rock	4	1	59	16
Run of ore in stope, chute, or bin			3	1
Explosives			5	1
Haulage	1		28	22
Falls of persons		1	11	9
Miscellaneous		1	64	93
Shaft				
Total	5	3	170	142
Per 1,000 300-day workers	2.98	2.54	101.49	120.03

Number of persons killed and injured per 1,000 employed at **quarries** *in the United States, 1911–1915.*

Year.	Killed.	Injured.
1911	1.69	48.76
1912	1.88	57.75
1913	1.72	2.83
1914	2.05	89.11
1915	1.47	96.00
Open-pit mines, without steam shovel, 1914	2.28	77.56
Open-pit mines, without steam shovel, 1915	2.58	121.99

NONFATAL INJURIES COMPARED BY MINING METHODS FOR THE YEARS 1914 AND 1915.

Figures 1 and 2 show the total nonfatal injuries in 1914 and 1915, classified by mining methods and reduced to a 300-day basis. In figure 2, for 1915, the injury rate for underhand stoping is the highest of all rates for that year. Data for this group of injuries in 1914 are not available, hence no figures comparable with those for 1915 are available. The other items, however, are on a comparable basis and agree so nearly with each other that they may be considered as thoroughly representative of each group, and, furthermore, they give a good check upon the data tabulated.

The injury rate due to falls of roof consistently rises in both diagrams from room-and-pillar to the caving system, then drops off gradually. The number of accidents from run of ore in stope or chute decreases, in both years, through the various mining methods, being the largest for underhand stoping and the smallest for open-pit mines where no steam shovels are used. Injuries from haulage system also show a gradual decrease through the various methods as listed, being highest in underhand stoping and lowest in open-pit mines where no steam shovels are used.

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DURATION OF NONFATAL INJURIES.

The amount of compensation awarded for injuries by the various State compensation commissions and insurance companies depends largely upon the length of time the applicant has been disabled. Complete data on this subject are not available, but from the figures collected by the bureau during the last five years, at least two points on a disability curve for metal mines seem reasonably accurate.

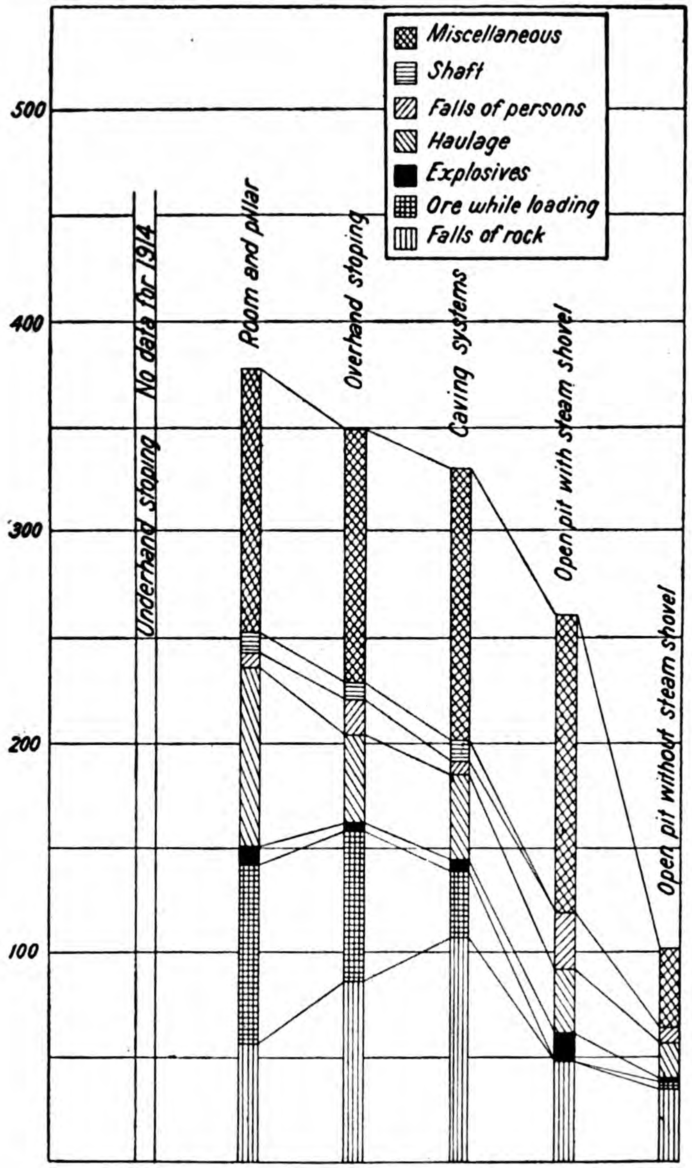

FIGURE 1.—Nonfatal injuries for 1914, compared by mining methods.

The bureau's classification of serious and slight injuries for 1911 to 1914, inclusive, was on the basis of 20 days; that is, serious injuries were classified as those causing a disability of 20 or more days. Upon this basis there were, during the four years above mentioned, 19,634 serious injuries and 100,864 slight injuries at metal mines, making a total of 120,498 nonfatal injuries causing a disability of more than one day. In the collection of this data the bureau's instructions to the operators were to eliminate all injuries in which the

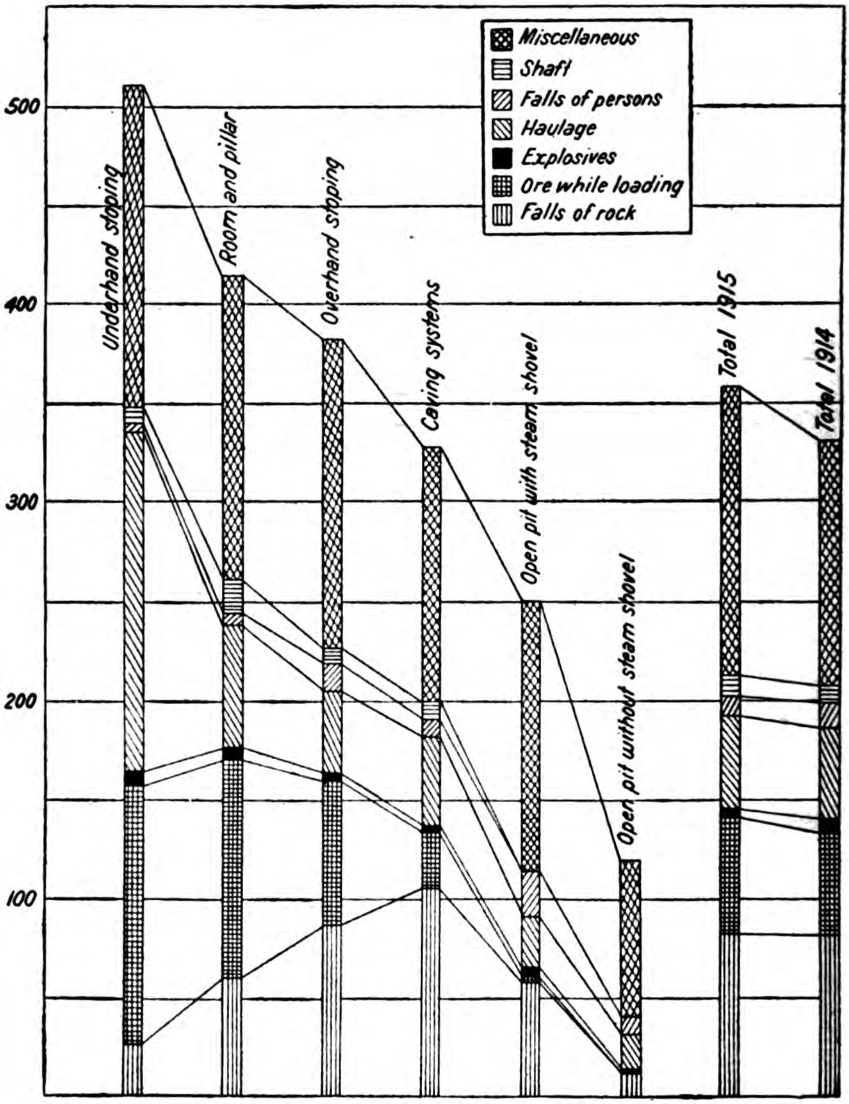

FIGURE 2.—Nonfatal injuries for 1915, compared by mining methods.

disability was less than one day. On the basis of these figures it appears that 83.70 per cent of the injured were sufficiently recovered to return to work by the twentieth day.

In 1914 the bureau tabulated the returns of 258 metal mining companies in which the reports were sufficiently complete that the data could be grouped by mining methods. This group of mines returned 24,306 nonfatal injuries, of which 3,899, or 16.46 per cent, were of the serious class, leaving 83.54 per cent as terminating by the twentieth day.

The nonfatal injuries at metallurgical plants were similarly classified for the years 1913 and 1914, 13,331 injuries being represented, of which 2,285 were of the serious class. In this group 83.60 per cent were sufficiently recovered to return to duty by the twentieth day. The bureau also subdivided the returns from ore-dressing plants and smelters. The results show that at the smelters 82.31 per cent of the injuries terminated by the twentieth day, and that in the mills 84.46 per cent returned to work within the same period.

The accidents in the quarry industry for the years 1911 to 1914, inclusive, were also segregated on the same basis. During this period there were 27,517 nonfatal injuries, of which 4,142 were of the serious class. The percentage terminating by the twentieth day in the quarry industry was, therefore, 84.94 per cent.

The bureau's figures for the year 1915 are classified on the basis of a serious injury being one which causes a disability of more than 14 days, so that it has been possible to calculate percentages of those injuries which terminate within two weeks. In the table on page 63, the returns of 280 metal-mining companies were placed in one group as being sufficiently complete to warrant a special study of accidents by mining methods. The returns of these companies showed 27,314 nonfatal injuries for the year 1915, of which number 5,996 were of the serious class; that is, causing a disability of more than 14 days. This shows that 78.05 per cent of the injuries terminated by the fourteenth day. The total number of nonfatal injuries reported for the metal mines of the United States in 1915 was 35,295, of which number 27,444, or 77.76 per cent, terminated within the 14-day period.

Data of the above nature for weekly periods is highly essential, and it is hoped that State compensation commissions in compiling their annual reports will include a table showing the number of injuries terminating within weekly periods of 1 to 13 weeks, inclusive. It would also be of scientific interest if the injuries terminating within two weeks were to be tabulated by days.

FATALITIES AT PLACER MINES.

Tables 22 and 23, following, contain the combined reports of 809 operators of placer mines, including dredges, hydraulic mines, and underground gravel mines. At these mines 6,100 men were employed and 19 men were killed in 1915, the fatality rate being 3.11 per 1,000 men employed, as compared with 2.30 for 1914, 2.25 for 1913, and 2.43 for 1912. The average length of time these mines were operated during the year was 210 days. The placer mines of Alaska worked approximately 180 days, and all other placers 251 days.

Although the fatality rate for placer mines (3.11) is somewhat lower than that for the other metal mines (3.61), yet the length of time the employees were exposed to the mining risk was about 70 days less. The slight injuries occurring at Alaska placer mines were not included in the Territorial mine inspector's report, hence these details are incomplete in this report, being based on reports received from only a small number of operators.

METAL-MINE, COAL-MINE, AND QUARRY ACCIDENTS COMPARED.

Comparative data for accidents at metal mines, coal mines, and quarries of the United States are shown in Tables 24 and 25. The majority of the coal-mining States have systematic coal-mine inspection, which tends to reduce the accidents; whereas many of the metal-mining States have no inspection service.

On account of the great disasters that sometimes occur in coal mines and the prominence given to them by the press, coal mining is usually considered much more hazardous than metal mining.

As the figures show, metal mines usually do not claim their death toll in disasters that involve many men, most of the men who die from accidents being killed one at a time.

Although the fatality rate in metal mines during 1915 was 3.64 per 1,000 men employed, and in coal mines 3.09, yet the comparison is not fair, for the reason that the metal miners worked 280 days as compared with 209 days for the coal miners. Thus the men in the metal mines were exposed to the mining risk 71 days longer than were the coal miners. If both rates be reduced to the 300-day basis, the metal-mine fatality rate becomes 3.90 per 1,000 300-day workers in comparison with 4.43 for the coal mines and 2.17 for quarries.

Percentages of men killed by various causes, also the number employed and the number killed, in metal mines, coal mines, and quarries in the United States are shown on pages 81 and 82.

TABLE 22.—***PLACER MINES:*** *Fatalities and injuries, by causes, during the calendar years 1911 to 1915, inclusive.*

Year.	Dredging.							Hydraulicking.									Underground.										
	Machinery.	Electricity.	Boiler explosions or bursting steam pipes.	Falls of persons.	Tools.	Other causes.	Total.	Cave of bank.	Explosives.	Hydraulic giants.	Falls of persons.	Rock while handling.	Tools.	Machinery, derricks, etc.	Other causes.	Total.	Fall of roof or gravel.	Timber or hand tools.	Explosives.	Falls of persons.	Haulage.	Drilling.	Hoisting.	Steam (when steam points are used).	Other causes.	Total.	Grand total.
	1	**2**	**3**	**4**	**5**	**6**		**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**		**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**		
Killed:																											
1912	2	......	......	......	......	2	4	2	1	1	......	......	......	......	......	4	......	......	......	......	......	......	......	......	......	......	**8**
1913	3	2	......	......	......	2	7	......	......	......	......	......	......	1	......	1	5	1	......	1	......	......	......	......	......	7	**15**
1914	......	2	......	2	......	1	5	......	1	......	......	......	......	......	1	2	2	......	1	1	......	......	2	......	2	8	**15**
1915	2	2	......	1	......	1	6	2	4	......	......	1	......	......	......	7	2	......	1	2	......	......	1	......	......	6	**19**
Total	7	6	......	3	......	6	22	4	6	1	......	1	......	1	1	14	9	1	2	4	......	......	3	......	2	21	**57**
Injured:																											
1912	17	......	1	8	27	18	71	3	......	2	5	7	4	1	4	26	5	3	1	......	1	1	1	......	......	12	**109**
1913	35	1	......	18	25	55	134	5	1	......	3	7	1	2	1	20	9	3	......	1	......	1	1	......	2	17	**171**
1914	88	2	......	20	79	37	226	4	1	2	5	4	3	6	6	31	9	4	1	2	......	2	......	......	......	18	**275**
1915	80	5	......	44	60	179	368	3	4	......	9	6	3	2	1	28	6	5	2	......	2	......	......	......	2	17	**413**
Total	220	8	1	90	191	289	799	15	6	4	22	24	11	11	12	105	29	15	4	3	3	4	2	......	4	64	**968**

TABLE 23.—***PLACER MINES:*** *Men employed, number killed, by causes, and days worked, during the year ended Dec. 31, 1915.*

State.	Number of active operators.		Men employed.	Days work performed.	Average number of days worked.	Number of men killed.																										
						Dredging.							Hydraulicking.									Underground.										
	1,000 or more days' labor.	Less than 1,000 days' labor.				Machinery. 1	Electricity. 2	Boiler explosions or bursting steam pipes. 3	Falls of persons. 4	Tools. 5	Other causes. 6	Total.	Cave of bank. 7	Explosives. 8	Hydraulic giants. 9	Falls of persons. 10	Rock while handling. 11	Tools. 12	Machinery, derricks, etc. 13	Other causes. 14	Total.	Fall of roof or gravel. 15	Timber or hand tools. 16	Explosives. 17	Falls of persons. 18	Haulage. 19	Drilling. 20	Hoisting. 21	Steam (when steam points are used.) 22	Other causes. 23	Total.	Grand total.
Alaska	230	90	3,500	630,000	180	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	2	....	....	1	....	....	4	4
California	44	150	1,680	496,384	295	2	....	....	1	....	1	4	....	4	....	....	1	....	....	....	5	1	....	....	....	....	....	....	....	....	1	10
Colorado	3	6	44	6,293	143	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
Idaho	9	65	253	38,288	151	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
Montana	5	45	180	34,500	192	....	2	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2
Nevada	8	63	103	23,020	223	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	1
New Mexico	1	3	18	2,035	113	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
Oregon	7	63	277	43,821	158	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	2	....	....	....	....	....	....	....	....	....	....	2
Washington	1	5	14	1,900	136	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
Other States	2	9	31	6,780	219	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0
Total, 1915	**310**	**499**	**6,100**	**1,283,021**	**210**	**2**	**2**	....	**1**	....	**1**	**6**	**2**	**4**	....	....	**1**	....	....	....	**7**	**2**	....	**1**	**2**	....	....	**1**	....	....	**6**	**19**
Total, 1914	300	443	6,521	1,329,104	204	....	2	....	2	....	1	5	....	1	....	....	....	....	....	1	2	2	....	1	1	....	....	2	....	2	8	15
Total, 1913	321	424	6,680	1,329,033	199	3	2	....	....	....	2	7	....	....	....	....	....	....	1	....	1	5	1	....	1	....	....	....	....	....	7	15
Total, 1912[a]	116	343	3,289	849,091	258	2	....	....	....	....	2	4	2	1	1	....	....	....	....	....	4	....	....	....	....	....	....	....	....	....	....	8

[a] Does not include Alaska.

TABLE 24.—*METAL MINES, COAL MINES, AND QUARRIES: Number of men employed and number of men killed during the years ended Dec. 31, 1911 to 1915, inclusive.*

Year.	Metal mines.			Coal mines.		
	Number ployed.	Number killed.		Number employed	Number killed.	
		Total.	Per 1,000 employed.		Total.	Per 1,000 employed.
1911	165,979	695	4.19	728,348	2,656	3.65
1912	169,199	661	3.91	722,662	2,419	3.35
1913	191,276	683	3.57	747,644	2,785	3.73
1914	158,115	559	3.54	763,185	2,454	3.22
1915	**152,118**	**553**	**3.64**	**734,008**	**2,269**	**3.09**
Total	836,687	3,151	3.77	3,695,847	12,583	3.40
Average	167,337	630	3.77	739,169	2,517	3.40

Year.	Quarries.			Total, mines and quarries.		
	Number employed.	Number killed.		Number employed.	Number killed.	
		Total.	Per 1,000 employed.		Total.	Per 1,000 employed.
1911	110,954	188	1.69	1,005,281	3,539	3.52
1912	113,105	213	1.88	1,004,966	3,293	3.28
1913	106,278	183	1.72	1,045,198	3,651	3.49
1914	87,936	180	2.05	1,009,236	3,193	3.16
1915	**100,740**	**148**	**1.47**	**986,866**	**2,970**	**3.01**
Total	519,013	912	1.76	5,051,547	16,646	3.30
Average	103,803	182	1.76	1,010,309	3,329	3.30

TABLE 25.—*METAL MINES, COAL MINES, AND QUARRIES: Principal causes of fatalities, showing percentage due to each cause, 1911 to 1915, by years.*

Industry.	Cause of death.								Total.
	Falls of overburden, roof, quarry material, ore, or coal.	Explosives.	Haulage and handling rock, ore, or coal.	Falls of person.	Electricity.	Machinery.	Gas and dust explosions.	Other causes.	
1911:									
Metal mines	**32.52**	**11.22**	**7.63**	**15.39**	**2.45**	**3.16**	....	**27.63**	**100.00**
Coal mines	47.40	6.02	17.13	1.28	3.73	1.51	13.74	9.19	100.00
Quarries	25.53	26.60	20.21	8.51	1.07	9.04	....	9.04	100.00
1912:									
Metal mines	**34.49**	**14.22**	**10.28**	**13.92**	**3.78**	**3.78**	....	**19.52**	**100.00**
Coal mines	49.03	6.08	19.14	1.36	3.64	1.65	11.99	7.11	100.00
Quarries	17.37	22.06	27.70	8.92	1.87	11.74	....	10.33	100.00
1913:									
Metal mines	**34.70**	**13.03**	**12.88**	**12.30**	**3.81**	**4.39**	....	**18.89**	**100.00**
Coal mines	45.39	4.95	18.31	1.80	3.16	1.80	18.45	6.14	100.00
Quarries	14.75	24.04	23.50	9.29	2.73	12.57	....	13.12	100.00
1914:									
Metal mines	**36.32**	**10.73**	**10.20**	**16.10**	**3.04**	**2.50**	....	**21.11**	**100.00**
Coal mines	46.09	5.95	18.79	2.85	4.07	1.87	14.22	6.16	100.00
Quarries	29.45	19.44	18.33	12.78	1.67	6.11	....	12.22	100.00
1915:									
Metal mines	**36.71**	**14.10**	**10.49**	**15.91**	**2.53**	**1.99**	....	**18.26**	**100.00**
Coal mines	47.55	6.83	18.64	1.37	4.36	1.68	13.40	6.17	100.00
Quarries	30.40	18.92	15.55	11.48	2.03	9.46	....	12.16	100.00

FATALITIES DUE TO EXPLOSIVES.

As shown in the accompanying table explosives are responsible for 11 to 14 per cent of the fatalities at metal mines; 5 to 7 per cent at coal mines; and 19 to 26 per cent at quarries, the relative percentages for the three industries being approximately 12, 6, and 22.

Percentage of fatalities due to explosives at metal mines, coal mines, and quarries.

Year.	Metal mines.	Coal mines.	Quarries.
	Per cent.	*Per cent.*	*Per cent.*
1911	11.22	6.02	26.60
1912	14.22	6.08	22.06
1913	13.03	4.95	24.04
1914	10.73	5.95	19.44
1915	14.10	6.83	18.92

Inasmuch as detailed information as to the causes of accidents due to explosives is lacking, it does not seem out of place to include herewith some details of accidents due to the use of explosives at coal mines.

The table on page 85 shows the number of fatalities due to the use of explosives in the coal mines in the United States from 1870 to the close of 1914, classified by the principal causes. Premature blasts and short fuse are responsible for 24.87 per cent of the explosives fatalities, while handling and transportation of explosives is second with 16.79 per cent. Although this table relates directly to the use of explosives in coal mines, yet many of the causes of accidents are similar to those which may result in fatalities at metal mines. The table is therefore given in order that the attention of the metal miner may be called to some of the principal causes of these accidents.

In connection with the fatalities due to explosives in coal mines, it may be stated that the principal explosive used was black powder. During the four years 1912 to 1915, inclusive, 28,653,387 kegs of black powder were used in the coal mines in the United States as compared with 1,668,088 kegs used in the metal mines. On the contrary, the coal mines, during the same period, used only 91,646,533 pounds of high explosives (excluding permissible explosives), whereas the metal mines, during the same period, consumed 375,193,050 pounds. The ratio, therefore, of the amount used in coal mines as compared with metal mines is approximately 17 to 1 for black powder and 1 to 4 for high explosives. Slightly more than one-half of the total quantity of high explosives used in coal mines was used in the anthracite mines of Pennsylvania, so that the ratio of the amount of high explosives used in bituminous coal mines to that used in metal mines is 1 to 8.

TABLE 26.—***ALL MINES:*** *Men employed during the years ended Dec. 31, 1911 to 1915, by States.*

State.	1911	1912	1913	1914	1915
Alabama	4,101	4,827	5,212	5,225	4,956
Alaska	....	1,914	8,000	8,000	8,125
Arizona	12,768	15,591	16,489	14,011	14,057
Arkansas	584	404	337	78	685
California	10,877	10,312	11,476	9,761	10,414
Colorado	10,404	8,892	15,949	9,228	6,369
Connecticut	164	259	255	216	108
Florida	4,305	4,461	4,538	2,885	1,737
Georgia	1,001	515	444	305	295
Idaho	4,801	6,229	5,769	5,249	5,190
Illinois	848	440	511	490	384
Iowa	244	200	231	281	214
Kansas	729	831	608	315	435
Kentucky	461	460	516	221	174
Maine	81	72	121	128	105
Maryland	231	329	359	69	223
Massachusetts	118	58	48	31	86
Michigan	31,584	29,469	28,174	27,272	27,512
Minnesota	16,548	16,559	19,546	17,694	14,572
Missouri	9,901	11,403	9,747	8,480	9,570
Montana	13,346	13,340	19,500	13,046	13,846
Nevada	6,210	7,547	7,316	6,821	5,713
New Hampshire	100	90	83	38	41
New Jersey	1,739	1,633	1,433	1,362	1,745
New Mexico	2,450	2,502	3,766	2,424	2,732
New York	3,202	2,710	3,345	3,002	2,558
North Carolina	997	1,068	1,167	994	627
Ohio	362	310	305	192	265
Oklahoma	418	541	641	596	855
Oregon	1,394	1,052	1,349	1,279	1,070
Pennsylvania	862	762	656	425	384
South Carolina	984	1,041	444	416	487
South Dakota	2,519	1,963	2,091	1,841	1,796
Tennessee	4,454	3,480	3,151	3,253	2,821
Texas	248	386	350	346	294
Utah	7,710	8,458	7,872	5,837	5,449
Vermont	180	181	143	112	98
Virginia	3,971	2,516	2,596	1,877	1,976
Washington	1,569	1,307	1,302	865	715
Wisconsin	2,844	3,834	4,330	2,576	2,651
Wyoming	612	662	616	480	386
Other States	58	591	490	394	398
Total, metal mines	**165,979**	**169,199**	**191,276**	**158,115**	**152,118**
Ore-dressing plants	(a)	(a)	14,985	15,128	18,564
Smelters	(a)	(a)	20,564	27,879	31,327
Total	**165,979**	**169,199**	**226,825**	**201,122**	**202,009**

[a] Not collected.

Of the total fatalities at metal mines during the years 1911 to 1914, inclusive, 12.30 per cent were caused by explosives, and in coal mines, 5.37 per cent. In other words, the percentage of fatalities at metal mines due to this cause is practically 2½ times as great as that in coal mines. During the 45-year period only 0.73 per cent of the fatalities from explosives in coal mines were due to thawing. This is largely accounted for by the use of such large quantities of black powder wherein no thawing is necessary. Data showing the fatalities in metal mines due to thawing of explosives are not available, but it is safe to state that the percentage of such accidents at metal mines is much higher because of the large amount of dynamite use as compared with the small quantity of black powder.

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TABLE 27.—***ALL MINES:*** *Total number of injuries, by causes, during the years ended Dec. 31, 1911 to 1915.*

Cause.	Number injured.						
	1911	1912	1913	1914	1915	**Total.**	**Percentage.**
UNDERGROUND.							
1. Fall of rock or ore from roof or wall	7,256	6,984	6,714	6,104	6,623	**33,681**	21.62
2. Rock or ore while loading at working face or chute	....	3,134	2,584	3,553	4,476	**13,747**	8.82
3. Timber or hand tools	2,063	2,856	3,795	2,730	3,210	**14,654**	9.41
4. Explosives	381	399	376	334	342	**1,832**	1.18
5 Haulage system (mine cars, mine locomotives, breakage of rope, etc.)	3,530	3,311	3,834	3,303	3,732	**17,710**	11.37
6 Falling down chute, winze, raise, or stope.	908	941	947	823	847	**4,466**	2.87
7. Run of ore from chute or pocket	981	1,041	1,118	649	682	**4,471**	2.87
8. Drilling accidents (by machine or hand drills)	1,397	1,613	1,500	1,488	2,157	**8,155**	5.23
9. Electricity	33	39	59	52	69	**252**	.16
10. Machinery (other than locomotives or drills)	682	471	487	204	449	**2,293**	1.47
11. Mine fires	24	12	12	6	42	**96**	.06
12. Suffocation from natural gases	18	35	21	22	82	**178**	.11
13. Inrush of water	14	10	17	12	34	**87**	.06
14. Nails, splinters, etc	....	241	318	234	686	**1,479**	.95
15. Other causes	3,465	2,992	3,010	3,783	4,462	**17,712**	11.37
Total number injured underground	20,752	24,079	24,792	23,297	27,893	**120,813**	77.55
SHAFT.							
16. Falling down shafts	93	104	100	50	61	**408**	.26
17. Objects falling down shafts	256	278	249	182	271	**1,236**	.80
18. Breaking of cables	7	6	9	9	5	**36**	.02
19. Overwinding	26	5	8	3	2	**44**	.03
20. Skip, cage, or bucket	....	245	219	260	259	**983**	.63
21. Other causes	244	143	148	196	238	**969**	.62
Total number injured by shaft accidents.	626	781	733	700	836	**3,676**	2.36
SURFACE (AT SURFACE YARDS AND SHOPS).							
22. Mine cars or mine locomotives, gravity or aerial trams	185	170	166	257	218	**996**	.64
23. Railway cars and locomotives	57	79	129	93	87	**445**	.29
24. Run or fall of ore in or from ore bins	116	120	54	95	102	**487**	.31
25. Falls of persons	....	393	376	387	412	**1,568**	1.01
26. Nails, splinters, etc	....	123	127	145	266	**661**	.42
27. Hand tools, axes, bars, etc	....	562	680	526	576	**2,344**	1.50
28. Electricity	23	29	22	26	49	**149**	.10
29. Machinery	381	473	418	333	394	**1,999**	1.28
30. Other causes	1,230	726	978	1,254	1,769	**5,957**	3.82
Total number killed or injured by surface accidents	1,992	2,675	2,950	3,116	3,873	**14,606**	9.37
OPEN PIT.							
31. Falls or slides of rock or ore	520	557	842	541	536	**2,996**	1.92
32. Explosives	150	174	203	130	46	**703**	.45
33. Haulage system (cars, locomotives, etc.).	500	378	479	329	229	**1,915**	1.23
34. Steam shovels	244	308	352	153	95	**1,152**	.74
35. Falls of persons	347	331	419	298	255	**1,650**	1.06
36. Falls of derricks, booms, etc	79	48	42	14	10	**193**	.12
37. Run or fall of ore in or from ore bins	13	9	28	8	15	**73**	.05
38. Machinery (other than locomotives or steam shovels)	347	172	189	208	167	**1,083**	.69
39. Electricity	12	13	14	8	10	**57**	.04
40. Hand tools	....	375	548	390	276	**1,589**	1.02
41. Other causes	995	834	1,380	1,024	1,054	**5,287**	3.40
Total number killed or injured by open-pit accidents	3,207	3,199	4,496	3,103	2,693	**16,698**	10.72
Grand total	**26,577**	**30,734**	**32,971**	**30,216**	**35,295**	**155,793**	**100.00**

Fatalities in ***coal mines*** *due to explosives used, 1870–1914.*

Cause.	Fatalities.	
	Total.	Per cent.
Handling and transportation	617	16.79
Handling caps, detonators, squibs, and fuse	44	1.20
Thawing explosives	27	.73
Tamping	109	2.97
Premature blast and short fuse	914	24.87
Blown-out shot	201	5.47
Flying pieces of rock or coal	614	16.71
Returned too soon	293	7.97
Delayed blast	33	.90
Shot breaking through rib or pillar	216	5.88
Suffocation by powder gas	127	3.45
Striking unexploded charge in removing débris	3	.08
Drilling into unexploded charge	69	1.88
Unclassified	408	11.10
Total	3,675	100.00

PRECAUTIONS TO BE TAKEN WITH EXPLOSIVES.

The following precautions, adapted from Miners' Circular 7,[a] are given for the purpose of calling attention to some of the principal dangers in handling explosives:

Never open a metal keg of powder with a pick or metal object. Use the opening provided by the manufacturer of the keg.

Never return to a shot that has failed to explode until at least **10 minutes** after lighting it, if squibs were used, or **12 hours** after lighting if **fuse** was used. When shots are fired electrically be sure that **all** wires are disconnected from the battery, and wait at least **5 minutes** before returning to the face.

Never allow powder or other explosive to remain exposed. Keep it in a well-locked box at least 100 feet from the working face and in an unfrequented place.

Never go nearer than 5 feet to a powder box or powder when smoking.

Never allow the point of the drill to become dull or to become of less than the standard gage, so that a drill hole may be made with it into which the cartridge may always be pushed freely.

Never withdraw a shot that has missed fire. Drill a fresh hole at least 2 feet from it but parallel to the old hole and fire this new hole. After the shot a careful search should be made for the unexploded charge to prevent its being struck by a pick and perhaps causing an explosion.

Never use iron or steel tampers. Have at least 6 inches of hard-drawn copper on the tamping end of the bar or, better still, use a hardwood tamping stick.

Never tamp shots with an iron or steel scraper, and do not push a cartridge into the drill hole with the scraper. The scraper rod should be tipped with at least 6 inches of brass or copper on the scraping end.

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[a] Rutledge, J. J., The use and misuse of explosives in coal mining: Miners' Circular 7, Bureau of Mines, 1913, pp. 32, 33.

Never take more than one day's supply of explosives into the mine at one time.

Never leave explosives in the mine overnight.

Never attempt to use frozen dynamite.

Never crimp a "cap" with the teeth. This practice is dangerous. Use the crimper.

ACCIDENTS AT METALLURGICAL WORKS.[a]

The data presented in the preceding pages are for mining operations only and in no way are intended to include accidents at ore-dressing plants and smelters. The Bureau of Mines has collected data showing the number of men employed and the number of accidents at ore-dressing plants and smelters for the calendar years 1913, 1914, and 1915, summaries of which are given in tables following.

Accidents at ore-dressing and smelting plants in the United States, classified by principal causes, during 1915.

Cause.	Ore-dressing plants.				Smelting plants.			
	Killed.		Injured.		Killed.		Injured.	
	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.	Total.	Per cent.
Haulage	5	16.67	123	5.87	12	31.58	590	10.32
Machinery	12	40.00	487	23.25	7	18.42	348	6.09
Falls of persons	6	20.00	249	11.89	3	7.90	499	8.73
Suffocation in ore bins	3	10.00	3	.14	1	2.63	8	.14
Flying or falling objects			192	9.17	1	2.63	914	15.98
Electricity	3	10.00	38	1.81	4	10.53	46	.80
Hand tools			235	11.22			633	11.07
Nails, splinters, etc			131	6.25			146	2.55
Burns (water, steam, gas, matte, slag)			12	.57	8	21.05	1,008	17.63
Other causes	1	3.33	625	29.83	2	5.26	1,526	26.69
Total, 1915	30	100.00	2,095	100.00	38	100.00	5,718	100.00

Summary of labor and accidents at metallurgical works.

	Men employed.	Day's work performed (shifts).	Number killed.		Number injured.	
			Total.	Per 1,000 employed.	Total.	Per 1,000 employed.
Ore-dressing plants:						
1913	14,985	4,846,338	16	1.07	1,977	131.93
1914	15,128	4,567,529	23	1.52	1,434	96.71
1915	18,564	5,732,184	30	1.62	2,095	112.85
Smelters:						
1913	20,564	7,292,766	47	2.29	4,247	206.53
1914	27,879	9,700,769	33	1.19	5,673	203.12
1915	31,327	10,878,486	38	1.21	5,718	182.53

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[a] Fay, A. H., Accidents at metallurgical works in the United States, 1915: Tech. Paper 164, Bureau of Mines, p. 5.

METAL-MINE ACCIDENTS IN FOREIGN COUNTRIES.

Table 28 has been compiled from official reports of representative foreign countries in which mining is an important industry. The table shows the number of men employed in and about metal mines, the number killed, and the rate of fatalities per 1,000 men employed. It will be noted that the fatality rates are lower than those of metal mines in the United States. One reason for the difference is that for many years rigid inspection has been enforced in most of the important foreign mining countries. In the older nations, as Great Britain, Germany, and France, the majority of the miners have worked about mines from childhood, as did their fathers and grandfathers before them. Another reason is that in these countries the majority of the miners speak a common language, and there is comparatively little misunderstanding of orders given by mine officials. A common language is essential to safety in mining.

FORM FOR MINE-ACCIDENT RECORDS.

As a result of the work already done by the Bureau of Mines in collecting accident statistics, the obtaining of more information regarding the various kinds of accidents has been found desirable. For example, the explosives accidents have all been reported under one item, as "Accidents due to explosives," but the safety engineer, the mine superintendent, and others in authority, who are making a study of the mine hazards, feel that there should be more detailed information concerning such accidents. Thus, "Accidents due to explosives" have included accidents due to transportation, premature shots, thawing explosives, etc.; but if many explosives accidents are due to some one cause, this cause should be brought to the attention of the safety engineer. To assemble all explosives accidents in one group makes it impossible to determine just where the principal hazard lies. The same is true of accidents due to electricity and haulage.

In order that more detailed information may be had, the bureau prepared a form in 1915 for recording accidents at mines and metallurgical works, in the hope that many of the mining companies would consider its adoption. This form was presented with two objects in view: First, that more detailed information on different kinds of accidents may be obtained; and, second, that the adoption of the form will help to standardize the records.

It is gratifying to note that about 175 of the leading mining companies requested copies of this form for use in keeping their records during 1916. From these records it is hoped that the bureau will be able to present details for 1916 that have not been brought out in previous accident reports.

Copies of this form will be supplied by the bureau with the understanding that a summary report will be made for the bureau's use at the close of the year.

TABLE 28.—*FOREIGN COUNTRIES: Men employed, and number killed, and number killed per 1,000 employed, in metal mines.*[a]

Country.	1909			1910			1911			1912			1913			1914			1915		
	Number employed.	Number killed.	Number killed per 1,000 employed.	Number employed.	Number killed.	Number killed per 1,000 employed.	Number employed.	Number killed.	Number killed per 1,000 employed.	Number employed.	Number killed.	Number killed per 1,000 employed.	Number employed.	Number killed.	Number killed per 1,000 employed.	Number employed.	Number killed.	Number killed per 1,000 employed.	Number employed	Number killed.	Number killed per 1,000 employed.
Australasia:																					
New South Wales	17,836	20	1.12	19,369	29	1.50	19,360	35	1.81	19,807	31	1.57	19,914	30	1.51	17,493	26	1.49	13,190	14	1.06
New Zealand	7,651	14	1.83	8,121	15	1.85	7,400	5	.68	5,239	5	.95	4,941	10	2.02	4,470	6	1.34	......	......	......
Queensland	12,050	26	2.16	12,342	18	1.46	11,091	10	.90	10,608	26	2.45	9,978	11	1.10	7,853	9	1.15	7,113	10	1.41
Tasmania[b]	6,054	6	.99	5,770	8	1.39	5,247	4	.76	5,566	53	9.52	6,106	6	.98	4,741	9	1.90	......	......	......
Victoria	18,671	15	.80	16,553	12	.72	14,051	19	1.35	11,856	16	1.35	11,931	9	.75	10,398	15	1.44	......	......	......
Western Australia	17,027	33	1.94	16,279	27	1.66	15,428	36	2.33	13,700	34	2.48	13,445	24	1.79	12,110	26	2.15	......	......	......
Austria	19,582	19	.97	19,621	16	.82	19,934	10	.50	20,890	20	1.00	......	......	......	......	......	......	......	......	......
France	24,436	73	2.99	27.183	86	3.16	29,998	85	2.84	31,602	104	3.29	......	......	......	......	......	......	......	......	......
Germany	93,928	91	.97	93,645	141	1.51	92,964	148	1.59	93,591	173	1.85	......	......	......	......	......	......	......	......	......
Great Britain[c]	28,437	40	1.41	28,676	43	1.50	29,025	43	1.48	28,058	43	1.53	27,412	32	1.16	23,709	24	1.01	......	......	......
Greece	8,389	13	1.55	6,933	9	1.30	6,764	14	2.07	6,180	12	1.94	......	......	......	......	......	......	......	......	......
Italy	52,648	69	1.31	49,995	59	1.18	49,498	117	2.36	48,225	71	1.47	47,497	108	2.93	46,412	60	1.29	......	......	......
Japan	81,312	138	1.70	84,728	118	1.39	80,896	142	1.76	81,921	129	1.57	......	......	......	......	......	......	......	......	......
Mexico[d]	81,438	471	5.78	......	......	......	36,641	265	7.23	12,678	39	3.08	......	......	......	......	......	......	......	......	......
Peru[d]	17,580	21	1.19	20,410	118	5.78	......	32	......	14,435	54	2.90	......	......	......	......	......	......	......	......	......
Portugal	7,858	11	1.40	6,554	11	1.68	7,484	10	1.34	7,769	7	.93	......	......	......	......	......	......	......	......	......
Russia	200,844	......	......	202,132	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
Spain[e]	150,681	282	1.87	155,182	256	1.65	143,863	180	1.25	149,884	260	1.73	......	......	......	......	......	......	......	......	......
Sweden[f]	13,238	16	1.21	13,775	23	1.73	14,216	......	......	14,658	......	......	......	......	......	......	......	......	......	......	......
Transvaal	192,038	1,018	5.30	205,687	882	4.29	225.538	934	4.14	240,000	900	3.75	223,380	851	3.81	......	......	......	......	......	......
United States	......	......	......	......	......	......	165,979	695	4.19	169,199	661	3.91	191,276	683	3.57	158,115	559	3.54	152,118	553	3.64

[a] Compiled from official reports.
[b] Figures for mines in Tasmania also cover coal mines and smelting works. The high rate for 1912 is due to one disastrous mine fire.
[c] Figures cover only mines coming under the "Metalliferous mines regulation act."
[d] Figures also cover coal mines.
[e] Figures also cover coal mines in which about 25,000 men are employed and metallurgical works employing about 25,000 men annually.
[f] Figures also cover coal mines and quarries.

STATE LAWS RELATING TO REPORTING OF ACCIDENTS AT METAL MINES.

By W. W. Adams.

Some features of the State laws relating to the reporting of accidents at metal mines are given in the following pages. In addition to providing compensation for injuries after a certain period of disability, usually two weeks, it is generally provided that hospital service and medical supplies shall be furnished by the employer to the injured workman from the date of injury to the day upon which compensation begins. Compensation for injuries causing death is also a provision common to all States having compensation laws, except Oklahoma. The constitution of Oklahoma prohibits any statutory limitation as to the amount recoverable for injuries resulting in death.

ALABAMA.

By resolution passed by the Alabama State Senate, February 1, 1915, a special committee on judiciary was appointed, consisting of five members of the House, and three from the Senate, to consider various questions, among which was the question concerning workman's compensation acts, and to report by bill or bills, as to them shall appear best.

ALASKA.

An act of the Legislature of Alaska, approved April 30, 1913, authorized the appointment of a Territorial mine inspector, subject to instructions of the Federal mine inspector, and provided that all serious or fatal accidents at **any mine employing six or more persons** should be reported immediately by the person in charge of the mine to the mine inspector of the district in which the mine was located. Each mine inspector was required to render to the governor a monthly report of all accidents in his district which resulted in serious injury or death.

As amended April 25, 1915, the law now provides that the Territorial inspector shall have jurisdiction over **all branches of mining,** shaft sinking, tunneling, quarrying, and dredging, and the machinery incident to the reduction of ores or the treatment of the material, provided that such jurisdiction shall apply only to the safety of the workers in such mining, etc., and provided also that the Territorial inspector shall have no jurisdiction over coal mines worked under lease from the United States Government. The inspector is required

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to distribute statistical blanks to mine operators, requiring statistics of accidents, labor, and production, to be filled in and returned to the inspector on or before December 31 of each year, under the same conditions as now required by the United States Bureau of Mines and the United States Geological Survey.

A compensation law, approved April 29, 1915, effective July 28, 1915, provides compensation for injuries to persons engaged in "mining operations," which are stated in the act to include "underground workings, underground mines, open-cut workings, surface working, stamp mills, roller mills, chlorination processes, cyanide processes, coke ovens, all reduction work of any kind or character, and work performed on or for the benefit of any mining claim, whether quartz or placer, including development and construction work as well as work carried on in connection with actual mining or milling." Employers of five or more men are presumed to have elected to accept the provisions of the act unless they file notice to the contrary with the United States commissioner. Compensation for injury begins on the fifteenth day of disability; but if the injured employee is disabled for eight weeks or longer, compensation is computed from the date of the injury. Disagreements concerning compensation to be paid under the law are settled by the judge of the district court.

ARIZONA.

The statutes of Arizona (chap. 33, laws of 1912) provide that all accidents causing death or serious injury at any mine shall be reported immediately to the State mine inspector. The inspector renders an annual report to the governor for the year ending November 30 (sec. 16).

By the act of June 8, 1912, as amended May 13, 1913, compulsory compensation is provided for accidental death or injuries causing disability for at least two weeks in all especially dangerous employments, including mining, quarrying, tunneling, ore-reduction works, and smelters. The law is elective as to industries not listed as especially dangerous.

CALIFORNIA.

Under an act approved April 8, 1911, as amended May 26, 1913, and August 10, 1913, compensation is provided for injury to any person engaged regularly in any occupation except that of farm, dairy, agricultural, viticultural, or horticultural labor. Since January 1, 1914, the law has been compulsory as to all employments except those named; and employers of persons engaged in the excepted classes of labor may, together with their employees, affirmatively elect to become subject to the law by filing notice to that effect with the industrial accident commission. Compensation for injury begins on the fifteenth day of disability. Written notice of injury must be given to the employer within 30 days by the injured employee or his representative. Every employer and every insurance company is required to report all accidents to the commission. The commission reports annually to the governor.

COLORADO.

Section 4303 of the revised statutes of Colorado for 1908 provides that all accidents causing death or serious injury involving the loss of two consecutive days' work at **any metalliferous mine,** mill, or metallurgical plant shall be reported immediately to the commissioner of mines. The commissioner is required by section 4268 to render biennial reports to the governor. The published reports are for the calendar year.

A workmen's compensation law was enacted April 10, 1915, effective August 1, 1915, applying to all **employers of four or more persons,** not including private domestic servants and farm and ranch laborers, engaged in a common employment. Employers are conclusively presumed to have accepted the provisions of the act unless prior to August 1, 1915, they have filed with the industrial commission a notice of their election not to be subject thereto. The law requires employers to keep a "record of all injuries, fatal or otherwise," and to report each accident within 10 days to the commission under penalty for failure so to do. In January and July of each year all employers are required to report to the commission the number of their employees during the preceding six months and to state the number of employees in each kind of employment; also to report the aggregate wages paid. Compensation is provided for employees whose injuries result in disability for more than three weeks, or for their dependents if the injuries result fatally. The industrial commission is required to report annually to the governor on or before December 15 for the preceding fiscal year and to include in its report a statement of the number of awards made by it and a general statement of the causes of accidents leading to the injuries for which the awards were made.

CONNECTICUT.

By an act of the Legislature of Connecticut approved May 29, 1913, and made effective January 1, 1914, compensation for injured workmen is provided. The act applied to all **employers of five or more persons,** whose election to accept its provisions is presumed in the absence of notice to the contrary. An act of May 20, 1915, provides that employers of less than five persons may, if they desire, elect to become subject to the law. Under the act of 1913 compensation for injury began on the fifteenth day of disability, but this has been changed to the eleventh day by the law of 1915. The governor was authorized to appoint five compensation commissioners, each to be assigned to a separate district, and who, when acting together, constitute the board of commissioners. If the employer and the injured employee, or his representative, reach an agreement within two weeks as to the compensation to be paid, the agreement shall be submitted by the employer to the commission for approval. The injured employee must, however, file his claim for compensation within one year. Employers are required to keep a record of all injuries causing disability of one day or more and make duplicate reports of such injuries to the commissioner, the duplicate reports to be transmitted to the factory inspector. The law provides that no State office other than the compensation commission shall require reports of injuries from employers who report such injuries to the commission.

IDAHO.

Section 207 of the revised code of Idaho for 1909 provides that all fatal or serious accidents at any mine shall be reported immediately to the inspector of mines or his deputy. The inspector is required by section 209 to render an annual report to the governor. The published reports are for the calendar year.

No compensation law has been enacted.

ILLINOIS.

The law of Illinois (acts of 1907, p. 308, sec. 1) requires **every employer of labor** to report, within 30 days, to the State bureau of labor statistics every accident causing death or serious injury involving a loss of 30 or more days' time.

By an act approved June 28, 1913, as amended June 28, 1915, compensation is provided for injured employees and an industrial board established for the administration of the law. The law applies to all employers engaged in certain enumerated industries, including "**mining, surface mining,** or quarrying; any enterprise in which explosive materials are manufactured, handled, or used in dangerous quantities; and any enterprise wherein molten metal, or explosive or injurious gases or vapors, or inflammable vapors or fluids, or corrosive acids, are manufactured, used, generated, stored, or conveyed in dangerous quantities."

It is made the duty of all employers to report to the industrial board all accidents which entailed a loss to the injured person of one week's time, or which caused death, for which compensation has been paid under the law. The application of the law is elective on the part of the employer. Election is presumed unless a written notice to the contrary is filed with the industrial board and notice of such declination is given to the employees.

INDIANA.

The "Indiana workmen's compensation act," approved March 8, 1915, effective September 1, 1915, applies to **all employers of labor,** except those engaged in farm labor or domestic service and casual employees, unless notice of the employer's refusal to accept the provisions of the law is filed with the industrial board at least 30 days prior to an accident. Employers in the excepted class may also affirmatively elect to come within the scope of the law. Compensation for injury begins on the fifteenth day of disability. Notice of injury must be given to the employer as soon as practicable by the injured employee or his representative. Employers must furnish all necessary information called for by the industrial board. The above act abolishes the bureau of inspection and provides that the deputies formerly under that bureau, including the inspector of mines, shall continue their work under the industrial board, until their successors shall have been appointed by the board. All employers, whether or not they elect not to come under the compensation law, are required to keep a record of all injuries, fatal or otherwise, and in one week after receiving knowledge of such injuries, to report to the industrial board all injuries causing absence from work for more than one day. Reports of the board are published annually.

IOWA.

Under an act of the Legislature of Iowa approved April 18, 1913, effective July 1, 1914, providing compensation for injuries to workmen, **all employers** are conclusively presumed to have elected to become subject to the law unless they file a notice to the contrary with the industrial commissioner. Compensation begins on the fifteenth day of disability. The injured employee, or his representative, must give notice of injury to the employer within 15 days, unless the employer already has actual knowledge of the accident. Employers are required to keep a record of "all injuries, fatal or otherwise," and within 48 hours after receiving knowledge of an injury, to forward a written report to the industrial commissioner. The commissioner reports biennially to the governor, who transmits the report to the general assembly.

KANSAS.

An act of the Legislature of Kansas approved March 14, 1911, provided compensation for injuries to workmen employed in any "factory, **mine,** or quarry, natural-gas plant, and all employments wherein a process requiring the use of any dangerous explosive or inflammable materials is carried on." As originally passed, the law applied only to employers of 15 or more workmen who had been engaged continuously for more than one month at the time of an accident, but an act approved March 10, 1913, broadened the scope of the law to include employers of five or more men. Compensation for injury begins on the fifteenth day of disability. Under the act of 1913 the employer's election to become subject to the law is presumed unless notice to the contrary is filed with the Secretary of State at Topeka. Notice of injury must be given to the employer within 10 days, and employers are required to render an annual report of accidents to the State commissioner and factory inspector.

KENTUCKY.

An act approved March 21, 1914, effective January 1, 1915, applies to all **employers of six or more persons** engaged in the operation of "coal mines; oil and gas wells; iron and steel mills, including blast furnaces, smelters, tube works, and rolling mills; foundries; quarries, stone crushers, gravel pits; and mines other than coal mines." Election by the employer to become subject to the law is presumed unless a notice to the contrary has been filed by November 1, 1914, with the workmen's compensation board, a body consisting of the attorney general, commissioner of insurance, and the commissioner of agriculture, labor, and statistics. No compensation is allowed for the first week of disability. Injured employees, or their representatives, must send notice of injury to the employer within one week; and employers are required to keep a record of all injuries, fatal or otherwise, and to make written report thereof within one week to the workmen's compensation board. The board reports annually to the governor.

LOUISIANA.

An act of the Legislature of Louisiana approved June 18, 1914, effective January 1, 1915, provides compensation for injuries to employees in "foundries, forges, smelters, blast furnaces, coke-burning plants; phosphate and sulphur works; marble or stone-cutting or polishing plants; **mines, mining plants**; quarries; oil, gas, sulphur, salt, or other wells; and any occupation entailing the manufacture, transportation, care of, use of, or regular proximity to dangerous quantities of explosives." Election to become subject to the law is presumed as regards employers in the above industries unless at least 30 days prior to an accident they have notified their employees to the contrary. Other employers may affirmatively elect to come within the scope of the law. Compensation for injury begins on the fifteenth day of disability. Within 15 days of an injury, notice must be given to the employer by the injured employee, or his representative. If death results from the injury, notice thereof must be given to the employer within 30 days by the person entitled to compensation.

MAINE.

The "Maine workmen's compensation act," approved April 1, 1915, applies to all **employers of more than five persons** who elect to become subject to the act. Compensation for injury begins on the fifteenth day of disability. Election to accept the provisions of the act is indicated by filing a notice to that effect with the industrial accident commission, an organization consisting of the insurance commissioner, the commissioner of labor and industry, and a third member—who must be an attorney—appointed by the governor. Written notice of injury must be given within 30 days by the injured employee, or another in his behalf, to the employer, and employers are required to report all accidents to the commission. The commission renders annual reports to the governor.

MARYLAND.

On April 16, 1914, the Legislature of Maryland enacted a workmen's compensation law, to be administered by the State industrial accident commission. The act applies to an enumerated list of industries which are considered extra hazardous, including "**mining**; reduction of ores and smelting; preparation of metals or minerals; tunneling and shaft sinking; quarries; clay or gravel pits; iron, steel, or metal foundries; rolling mills; and the manufacture of explosives and dangerous chemicals." No compensation is provided for the first two weeks of disability, except medical and hospital services and supplies. The act became effective to cover injuries sustained on or after November 1, 1914. Employers are required to report all accidents to the commission, and the commission renders annual reports to the governor on or before January 1 showing, among other things, the number and causes of all accidents.

MASSACHUSETTS.

An act approved July 28, 1911, effective July 1, 1912, created the Employees' Insurance Association, to which **any employer of labor** may become a subscriber. Compensation for injury begins on the fifteenth day of disability. Written notice of injury must be given to the employer or the association as soon as practicable by the injured employee, or some other person in his behalf. Employers are required to keep a record of "all injuries, fatal or otherwise," and to make a report of each injury to the industrial accident board within 48 hours, excluding Sundays and legal holidays. The law authorizes any insurance company, as well as the Employees' Insurance Association, to insure the payment of compensation to injured employees. An act approved June 25, 1914, effective October 1, 1914, directs the association and all insurance companies to furnish, upon request, written information to the industrial accident board, including statistical facts and figures and the names of all employers insured by them.

MICHIGAN.

Section 8 of act 163 of the Legislature of Michigan, approved April 25, 1911, requires the county mine inspector to inspect every working mine in his county at least once every 60 days, and section 10 makes it the duty of all operators to render any needed assistance to the inspector in his work. Section 13 provides that the inspector shall report annually to the county clerk all mine accidents causing death or personal injury. The published reports are for the fiscal year ending September 30.

An act approved March 20, 1912, effective September 1, 1912, provides compensation for injured workmen, and applies to all employers who have any person in service under contract of hire who elects to be subject to the law. Election is indicated by filing with the industrial accident board a written statement to that effect. Compensation for injury begins on the fifteenth day of disability, but if disability continues eight weeks or longer compensation is computed from the date of injury. Employers are required to keep a record of all injuries to their employees, and to report such injuries within 10 days after any accident to the industrial accident board.

Certain amendments by the acts of April 10, 1913, and April 28, 1915, do not alter the above provisions of the law.

MINNESOTA.

Paragraph 3924, general statutes of Minnesota, 1913, provides for the appointment of a county mine inspector for every county in which at least five mines are in operation. The inspector must visit every mine in his county at least once every 60 days (par. 3926). All operators are required (par. 3931) to give immediate notice to the inspector of all accidents causing loss of life or serious personal injury. The inspector's annual reports are for the fiscal year ending June 30, and are included in the biennial report of the State commissioner of labor (par. 3934).

An elective compensation law provides compensation for injuries causing death or causing disability for more than two weeks. The law (act of Apr. 24, 1913) applies to all industries except farm and domestic service and interstate or foreign commerce.

MISSOURI.

Section 8462, revised statutes of Missouri, 1909, as amended March 25, 1913, provides that any person having charge of a mine shall report to the State mine inspector all accidents causing loss of life or serious personal injury. The inspector renders **an annual report** to the governor for the calendar year.

No compensation law has been enacted.

MONTANA.

The "Montana workmen's compensation act," approved March 8, 1915, effective July 1, 1915, applies to all hazardous occupations, including "shaft sinking; tunnels, marble, stone, or brick work; blast furnaces; quarries; stone crushers; smelters; gas works; coal mines; **mines other than coal**; and rolling mills," provided the employers elect to become subject to the law. Compensation for injury begins on the fifteenth day of disability. An injured employee, or some other person in his behalf, is required to send notice of the injury to the employer within 60 days. Every employer and every insurer must report all accidents to the industrial accident board, an organization consisting of the commissioner of labor and industry, the State auditor, and a third member appointed by the governor.

NEBRASKA.

The "Nebraska workmen's compensation law of 1913," approved April 21, 1913, applies to **all employers of five or more persons,** except household servants, farm laborers, and employees on interstate railways. The employers' election to accept the provisions of the law is presumed, in the absence of notice to the contrary. Compensation for injury begins on the fifteenth day of disability; but if disability continues for eight weeks or longer, then compensation commences on the date of the injury. The injured employee, or another person in his behalf, must notify the employer of the injury as soon as practicable.

NEVADA.

The Nevada laws of 1912 provide that **all mine operators employing wage earners** shall render a report to the inspector of mines of all accidents causing death or serious injury. The report of the inspector is for the fiscal year ending November 30.

Compensation for injuries to employees of all **employers of two or more persons** is provided for by an act approved March 15, 1913, effective July 1, 1913, as amended by the act approved March 22, 1915. Election by employers to become subject to the law is presumed unless notice to the contrary is filed with the State industrial commission. Compensation begins on the eighth day of disability; but if disability continues for three weeks, compensation is computed from the date of the injury. Employers are required to send to the industrial commission an immediate report of all accidents to their employees.

NEW HAMPSHIRE.

An act of the Legislature of New Hampshire approved April 15, 1911, effective January 1, 1912, providing compensation for injuries to employees, applies to certain enumerated industries considered dangerous, including "all work necessitating dangerous proximity to gunpowder, blasting powder, dynamite, or other explosives where the same are used as instrumentalities of the industry; and work in or about any quarry, **mine**, or foundry." The employer's election to become subject to the act is indicated by filing a notice to that effect with the commissioner of labor, and a bond as security for the employer's liability to pay compensation for injuries to his workmen. No compensation is provided for injuries which do not disable the employee for at least two weeks from earning full wages. Notice of injury must be given by the injured employee as soon as practicable to his employer; and employers render such reports to the commissioner of labor as are required by him.

NEW JERSEY.

An act approved by the Legislature of New Jersey March 24, 1904, as amended March 26, 1912, provides that all accidents resulting in death, or that prevent the injured person from resuming work within two weeks, shall be reported to the commissioner of labor within 24 hours after the expiration of four weeks or after the death of the person injured. An act approved April 17, 1914, and effective that date, amended the act of March 24, 1904, by creating the office of inspector of mines and quarries and authorized the appointment of an inspector.

The State has an elective compensation act (Laws of 1911, chap. 95), and the statutes require **every employer** to report all accidents to the "employers' liability commission," and to state whether the employer is subject to the compensation law.

NEW YORK.

An act of the Legislature of New York approved May 22, 1915, provided for the creation of an industrial commission, consisting of five members appointed by the governor, to have jurisdiction over the department of labor. The department of labor is divided into bureaus, as follows: Inspection, statistics and information, mediation and arbitration, industries and immigration, employment, and workmen's compensation. The industrial commission is required to submit all questions of general policy to the industrial council, an advisory body consisting of 10 members representing employers and employees. It is provided that wherever, in previous laws, reference is made to the "department of labor," "commissioner of labor," "industrial board," or "workmen's compensation commission," such references shall hereafter be understood to mean the industrial commission.

Chapter 15 of the New York laws of 1910 provides that all accidents causing loss of life or injury incapacitating any person for work in the operation of a mine or quarry, or in the construction or repair of a tunnel, shall be reported within 48 hours to the commissioner of labor.

Under the workmen's compensation law, approved March 16, 1914, effective July 1, 1914, compensation is provided for accidents causing injury or death to persons engaged in certain enumerated industries classed as hazardous, among which are included **mining**; reduction of ores and smelting; preparation of metals or minerals; quarries; sand, shale, clay, or gravel pits; lime kilns; iron, steel or metal foundries; rolling mills. The law is compulsory as to the industries enumerated. Compensation begins on the fifteenth day of disability. All accidents, fatal or otherwise, must be reported by the injured person or by another person in his behalf to the employer, and by the employer to the compensation commission. Nonfatal accidents must be reported to the commission by the employer within 10 days after injury and fatal accidents within 30 days after the death of the injured employee.

OHIO.

An act of the Legislature of Ohio approved June 15, 1911, as amended March 14, 1913, provides compensation for injuries to workmen, and applies to all **employers of five or more persons** in the same business or establishment. The law is compulsory as to employers of five or more men, and employers of less than five persons may elect to become subject thereto by paying the proper premiums into the State insurance fund. No compensation is provided for the first week of disability. Employers are required to keep a record of "all injuries, fatal or otherwise," and to report such injuries within one week to the State liability board of awards. The board reports annually to the governor.

OKLAHOMA.

The "Oklahoma workmen's compensation law," approved March 22, 1915, effective September 1, 1915, applies to all hazardous employments in which more than two persons are engaged, including factories, powder works, foundries, blast furnaces, reduction works, smelters, dredges, wells, **mines**, and quarries, and is compulsory in its application to these industries. Compensation for injuries begins on the fifteenth day of disability. Compensation for injuries causing death is not provided for by this law, being prohibited by article 23 section 7, of the State constitution, which provides,

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"The right of action to recover damages for injuries resulting in death shall never be abrogated and the amount recoverable shall not be subject to any statutory limitation."

Notice of injury must be given by the injured employee, or some one in his behalf, within 30 days, to his employer and to the State industrial commission. Employers are required to keep a record of "all injuries, fatal or otherwise," and to report such injuries within 10 days or a reasonable time thereafter to the commission. The commission is required to render an annual report to the governor.

OREGON.

An act of the Legislature of Oregon approved February 18, 1911, provides that **any employer of labor who employs more than three persons at a time** shall report to the commissioner of labor statistics and inspector of factories and workshops all accidental deaths, or injuries causing the injured person to cease work.

An act approved February 25, 1913, created a State industrial accident commission and provided for an industrial accident fund consisting of premiums paid by employers who accept the provisions of the act.

Election on the part of operators to be subject to the law is presumed in the case of certain hazardous industries, including foundries, blast furnaces, **mines**, wells, smelters, powder works, and quarries, unless notice of the employer's declination is filed with the commission; and employers in all other industries may accept the law by affirmative election. Employers are required to report to the commission "any accident" to any workman. This act was approved by the electors at a referendum held November 4, 1913. An amendment of February 24, 1915, does not alter the above provisions of the law.

PENNSYLVANIA.

On June 2, 1915, the Legislature of Pennsylvania passed a workmen's compensation law applicable to all accidents occurring on or after January 1, 1916. The employer's election to become subject to the law is conclusively presumed unless he files notice to the contrary with the bureau of workmen's compensation of the department of labor and industry. No compensation is provided for the first 14 days of disability except medical and hospital services and supplies. Compensation for death is provided if death occurs within 300 weeks after the injury. The bureau prepares and publishes all necessary blank forms and distributes same to employers, insurers, and employees applying therefor. Funds paid by employers who elect to become subject to the law constitute the workmen's insurance fund, which is administered by the workmen's insurance board. The State treas-

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urer is custodian of the fund. The workmen's insurance board files with the bureau of workmen's compensation a notice of the names and business addresses of all employers who are subscribers to the fund. Within seven days after an accident to an employee, employers are required to send notice of such accident to the workmen's insurance board, but this requirement is satisfied if within seven days the employer files a notice of the accident with the department of labor and industry as required by the act of July 19, 1913. The board shall, if necessary, investigate all accidents reported, and is authorized to appoint a manager, inspectors, and other assistants to administer the fund and to perform the duties imposed on the board.

The board is authorized to divide the State into "compensation districts" and to appoint for each district a referee to whom employees' claims for compensation are referred by the bureau when the employer and employee can not themselves agree as to the compensation to be paid.

When the bureau receives notice from the board that any employer has become a subscriber to the fund, the bureau shall promptly transmit to the board a copy of any accident notice received by the bureau from any subscribing employer. The board is authorized to supervise and direct the work of the bureau, and to hear all appeals from the decisions of referees.

SOUTH DAKOTA.

By an act approved March 1, 1890, the governor of South Dakota was authorized to appoint an inspector of mines, whose duty it was to visit personally each year each mining county and to examine as many mines therein as possible, and make recommendations as to the safety of the employees. Mine operators were required to report to the inspector all accidents causing serious injury or death. The above act, as amended March 4, 1915, provides that the inspector shall render annual reports to the governor on January 1 and enumerate in said reports all serious or fatal accidents to employees at the mines and the nature and cause of such accidents. The inspection law applies to all mines except those worked solely by the owners or lessees.

No compensation law has been enacted.

TENNESSEE.

An act of the Legislature of Tennessee approved April 19, 1913, effective the same date, authorized the creation of the workmen's compensation commission, consisting of five members appointed by the governor, the members to serve for two years or until their report is submitted. The commission was directed to study the subject of workmen's compensation and to report thereon to the next meeting of the general assembly. No compensation law has yet been enacted.

TEXAS.

An act of the Legislature of Texas approved April 16, 1913, effective September 1, 1913, providing for the compensation of injured employees, covers **all employers of more than five persons**, except those engaged in farm labor, operating railways as common carriers, or those working for a cotton gin. Compensation begins on the eighth day of disability. Election by employers to become subject to the law is indicated by subscribing to the Texas Employees Insurance Association. Notice of injury must be sent by the injured employee, or by some other person in his behalf, to the subscribing employer or to the insurance association. Employers are required to keep a record of all injuries, fatal or otherwise, and within eight days of each injury to make a written report thereof to the State industrial accident board, consisting of three members appointed by the governor.

The law also authorizes any insurance company to issue policies to pay compensation as provided for under the act, and the holders of such policies are regarded as subscribers so far as applicable under the act.

VERMONT.

The "Vermont workmen's compensation act," approved April 1, 1915, effective July 1, 1915, applies to all **employers of more than ten persons**, except domestic and casual employees and those earning over $1,500 annually. Election by the employer to become subject to the law is presumed in the absence of notice to the contrary; and employers of ten or less than ten persons may also affirmatively elect to accept the provisions of the act. Compensation for injury begins on the fifteenth day of disability, and compensation for death is limited to cases where death results within two years of the accident. Notice of injury must be given to the employer as soon as possible by the injured employee, or some other person in his behalf. Employers are required to keep a record of "all injuries, fatal or otherwise," and to report all injuries causing disability of one day or more to the State industrial accident board within 72 hours, excluding Sundays and legal holidays. The board reports biennially to the general assembly.

WASHINGTON.

By an act approved March 14, 1911, amended March 22, 1915, the Legislature of Washington established an industrial insurance department to administer a compulsory compensation law applicable to an enumerated list of extra-hazardous industries, among which are included **mining**, quarrying, dredges, tunnels, blast furnaces, foundries, rolling mills, and powder works. Section 14 requires all employers

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who are subject to the provisions of the law to render an immediate report of any accident to the industrial insurance department.

WEST VIRGINIA.

An act of the Legislature of West Virginia (ch. 10, Laws of 1913), which became effective October 1, 1913, provides compensation for injuries to all persons employed in "coal mines, oil and gas wells, iron and steel mills, blast furnaces, smelters, rolling mills, quarries, stone crushers, mines other than coal mines, explosive works, tunnels, and shafts." An act of the legislature approved February 26, 1915, broadened the law to include all works in which articles of an explosive nature are mixed or manufactured, and provided for the organization of the office of State compensation commissioner to administer the compensation fund which had previously been administered by the public service commission. No compensation is paid for the first week of disability. The act is elective on the part of employers, and employees are required to apply for compensation within six months after date of injury. Employers are required to furnish the commissioner with all information required by him. The commissioner renders annual reports to the governor, showing causes of accidents for which awards have been granted.

WISCONSIN.

The Legislature of Wisconsin passed an elective workmen's compensation law, approved May 3, 1911, applying to all employers of four or more persons, election to be made by filing with the industrial accident board a notice that the employer elects to become subject to the provisions of the law, the election to be binding for one year and thereafter presumed to continue without further notice in the absence of notice of withdrawal. Compensation is provided for injuries resulting in disability for more than one week.

An act approved June 27, 1911, requires that every employer of four or more persons shall keep a record of all accidents causing death or disability to any employee, and that a similar record shall also be kept by all casualty insurance companies and all other societies or persons indemnifying employers against liability; and that within the first five days of each month all such accidents shall be reported to the industrial accident board.

An act of June 30, 1911, created the "industrial commission of Wisconsin" and provided that the commission should supersede and assume the duties of the industrial accident board.

By an act approved June 26, 1913, the law was amended to provide that on and after September 30, 1913, all employers of four or more persons shall be presumed to have elected to accept the provisions of

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the act unless notice to the contrary is filed with the industrial commission. The act does not apply to farmers and farm labor.

WYOMING.

The "Wyoming workmen's compensation law," approved February 27, 1915, effective April 1, 1915, applies to extra-hazardous industries, including foundries, blast furnaces, smelters, natural gas plants, oil wells, dredges, **mines**, quarries, and powder works, provided five or more men are employed therein continuously for more than one month at the time of the accident; but if dangerous explosives are used, the law is applicable even if less than five men are employed. Compensation for injuries begins on the eleventh day of disability. Employers must report within 20 days all injuries received by employees to the clerk of the district court of the county where the accident occurred, on blanks supplied by the State treasurer, who has the custody of the industrial accident fund. Compensation is paid by the treasurer upon an order signed by the judge of the district court.

PUBLICATIONS ON ACCIDENT STATISTICS.

A limited supply of the following publications of the Bureau of Mines has been printed and is available for free distribution until the edition is exhausted. Requests for all publications can not be granted, and to insure equitable distribution applicants are requested to limit their selection to publications that may be of special interest to them. Requests for publications should be addressed to the Director, Bureau of Mines.

The Bureau of Mines issues a list showing all its publications available for free distribution as well as those obtainable only from the Superintendent of Documents, Government Printing Office, on payment of the price of printing. Interested persons should apply to the Director, Bureau of Mines, for a copy of the latest list.

PUBLICATIONS AVAILABLE FOR FREE DISTRIBUTION.

BULLETIN 115. Coal-mine fatalities in the United States, 1870–1914, with statistics of coal production, labor, and mining methods, by States and calendar years, compiled by A. H. Fay. 1916. 370 pp., 3 pls., 13 figs.

TECHNICAL PAPER 46. Quarry accidents in the United States during the calendar year 1911, compiled by A. H. Fay. 1913. 32 pp.

TECHNICAL PAPER 48. Coal-mine accidents in the United States, 1896–1912, with monthly statistics for 1912, by F. W. Horton. 1913. 74 pp., 10 figs.

TECHNICAL PAPER 61. Metal-mine accidents in the United States during the calendar year 1912, compiled by A. H. Fay. 1913. 76 pp., 1 fig.

TECHNICAL PAPER 92. Quarry accidents in the United States during the calendar year 1913, compiled by A. H. Fay. 1914. 76 pp.

TECHNICAL PAPER 118. Coke-oven accidents in the United States during the calendar years 1913 and 1914, compiled by A. H. Fay. 1915. 16 pp.

TECHNICAL PAPER 124. Accidents at metallurgical works in the United States during the calendar years 1913 and 1914, compiled by A. H. Fay. 1915. 28 pp.

TECHNICAL PAPER 128. Quarry accidents in the United States during the calendar year 1914, compiled by A. H. Fay. 1915. 45 pp.

TECHNICAL PAPER 129. Metal-mine accidents in the United States during the calendar year 1914, compiled by A. H. Fay. 1915. 96 pp., 1 pl., 3 figs.

TECHNICAL PAPER 151. Coke-oven accidents in the United States during the calendar year 1915, compiled by A. H. Fay. 1916. 18 pp.

TECHNICAL PAPER 164. Accidents at metallurgical works in the United States during the calendar year 1915, compiled by A. H. Fay. 1916. 20 pp.

Coal-mine fatalities in the United States during the calendar year 1914, with detailed figures for December, compiled by A. H. Fay. 1915. 30 pp.

PUBLICATIONS THAT MAY BE OBTAINED ONLY THROUGH THE SUPERINTENDENT OF DOCUMENTS.

BULLETIN 69. Coal-mine accidents in the United States and foreign countries compiled by F. W. Horton. 1913. 102 pp., 3 pls., 40 figs. 25 cents.

TECHNICAL PAPER 27. Monthly statement of coal-mine accidents in the United States, January to August, 1912, and statistics for 1910 and 1911, compiled by F. W. Horton. 1912. 24 pp. 5 cents.

TECHNICAL PAPER 40. Metal-mine accidents in the United States during the calendar year 1911, compiled by A. H. Fay. 1913. 54 pp. 5 cents.

TECHNICAL PAPER 73. Quarry accidents in the United States during the calendar year 1912, compiled by A. H. Fay. 1914. 45 pp. 5 cents.

TECHNICAL PAPER 94. Metal-mine accidents in the United States during the calendar year 1913, compiled by A. H. Fay. 1914. 73 pp. 10 cents.

Coal-mine fatalities in the United States during the calendar year 1915, with detailed figures for December, compiled by A. H. Fay. 1916. 80 pp., 3 figs. 10 cents.

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